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B.M.H.O.

HARRY GOVIER SEELEY AND THE KARROO REPTILES

7 AUG 1962

W. E. SWINTON

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
HISTORICAL SERIES Vol. 3 No. 1
LONDON: 1962

Harry Govier Seeley
[1839-1909]

HARRY GOVIER SEELEY AND THE KARROO REPTILES

BY

WILLIAM ELGIN SWINTON

Pp. 1–39 ; Frontispiece ; 5 Text-figures

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7 AUG 1962

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HARRY GOVIER SEELEY AND THE KARROO REPTILES

By W. E. SWINTON

HARRY GOVIER SEELEY was born in London on 18th February, 1839. He was the second son of Richard Hovill Seeley, a goldsmith, by Richard's second wife, Mary Govier, who was of Huguenot descent.

Richard was a son of Leonard Benton Seeley, a London publisher and a philanthropist, so that the young Seeley was born into a family where scholarship, a love of books and of fine art were appreciated. His cousin was Sir John Richard Seeley (1834–95) a distinguished historian and essayist.

As a boy he was greatly influenced by lectures. They stimulated his curiosity and directed his reading, and the times were rich in scientific orators. Sir Richard Owen, Edward Forbes, Sir Andrew Ramsay and W. E. Brayley were among his mentors. A course of lectures by Brayley, on Terrestrial Magnetism, first awakened his interest in Geology and the pages of Lyell's *Principles of Geology* became his first hunting ground. While apprenticed to his uncle, John Seeley, who was a conveyancing barrister, he became very interested in comparative osteology, preparing the skeletons of birds and small animals and even fish, noting the differences of articulation of the bones.

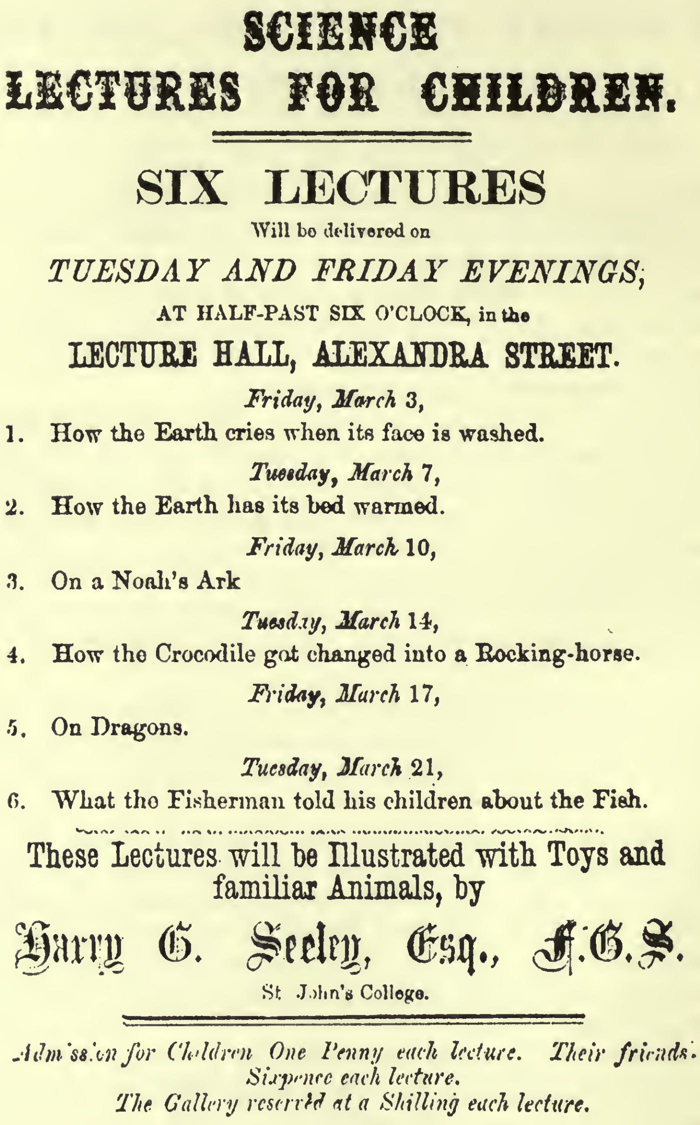
Soon he discovered the wealth of materials available for study in the Natural History Departments of the British Museum and he found a friend there in S. P. Woodward who was for seventeen years (1848–65) an assistant in the Department of Geology.

Many of the lectures he attended (especially those of J. Forbes Ramsay) were at the Royal School of Mines, and these led him, when he was about twenty years of age, to enter Sidney Sussex College, Cambridge, in search of wider knowledge.

There is no record of his studies there, indeed he may well have been a dilettante and he certainly never took a degree. Nevertheless his keen interest in the natural sciences attracted Professor Adam Sedgwick's attention and in 1859 he was appointed museum assistant to the Professor.

There is little doubt that at first his tasks were menial; cleaning, tidying and arranging the rocks and fossils in the Woodwardian Museum. But the wealth of material awaiting attention was an incentive to the bright young student who tried hard to understand the nature and the provenance of the things in front of him. Soon Sedgwick could report that Seeley "could not only be trusted to arrange specimens in the Museum but could occasionally take his place in the lecture-room".

Until 1873, when Adam Sedgwick died, Seeley was assistant, deputy and amanuensis, all in one, in both class-room and museum. Yet frequently he was heard in his own right, as when he gave courses of popular lectures to young people (see Text-fig. 1). It is easy to see that in this congenial atmosphere the young man developed in several directions. He became skilled in handling specimens and appreciative of the need for full documentation of their occurrence and history; he



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5. On Dragons.

Tuesday, March 21,
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St. John's College.

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FIG. 1

grew instinctively to recognize differences between fragmentary fossils ; he learned the lessons of ecology, that the fossil is only part of a greater whole that can yet be rediscovered ; and that all these matters were capable of being interpreted and transmitted in comparatively simple form to audiences that often became enthusiastic. The experience in the lecture rooms of Cambridge was to fortify him in a career in which the spoken word was a serious rival to the written one, and Seeley was a prolific writer.

That he had personal problems to conquer seems clear. Though some have remembered his lectures as engagingly simple and original, others, notably H. B. Woodward, have recorded his style as dry and monotonous. Indeed, his single-handed life in the museum for nearly twelve years might seem to have engendered such a style. Yet this was not so and the acute attention he gave to his tasks seems to have increased the liveliness of his mind and prompted him to ingenuity in method and expression. It did much more than that too, for it led him, as a magnet draws the needle, into the field in which he was to make so many fundamental discoveries.

The Woodwardian Museum collections were especially rich in material that had been obtained from the " coprolite pits " of the Cambridge Greensand. These pits had been extensively worked for the phosphate which was derived from the nodules but the diggings revealed a considerable fauna, no doubt derived from the Upper Gault by erosion. Many of these fossils were phosphatized and while there are numerous Invertebrates represented, the Vertebrates form a remarkable series, particularly of reptiles of sea, land and air. One bird, *Enaliosaurus*, is also known. Today the best exposure of the Cambridge Greensand is at Barrington, 6 miles SW. of Cambridge, though fossils are scarce in it.

It was this series that particularly appealed to Seeley. The specimens were intriguing, their nature was virtually unknown and the fauna unpublished.

To this task the young curator applied himself with vigour and in 1869 there appeared, printed at the University Press, *Index to the Fossil Remains of Aves, Ornithosauria and Reptilia from the Secondary System of Strata arranged in the Woodwardian Museum of The University of Cambridge* by Harry Govier Seeley.

The volume has an appreciative preface by Professor Adam Sedgwick, still Woodwardian Professor of Geology after fifty-two years. Sedgwick in fact justifies his retention of office " despite infirmity of sight and feebleness of health " by the excellent work of his " friend and assistant ". This preface is historically valuable. It details the circumstances in which many of the Museum's treasures were obtained and shows a width of collection. He had an assistant, Mr. Henry Keeping, later well known as a collector, and the start in excavation and collecting that Seeley made in and around the phosphate diggings was energetically maintained and extended by Keeping. Seeley was thus left in greater peace to concentrate upon his researches. This *Index* is tribute to both museum work and research. Ornithosauria (now known as Pterosauria and which are reptiles) ; Aves ; Dinosauria ; Dicynodontia (from South Africa) ; Ichthyosauria ; Crocodilia ; Plesiosauria ; Chelonia ; and Lacertilia are the main headings. Among them Seeley was responsible for the naming of nine new genera and eighty-five new species. The work itself is meticulous. The young seeker for knowledge was now a fit member of a generation in which palaeontological discovery was accelerating and during which it tended to outrun nomenclatural appreciation.

The *Index* was followed, in 1870, by a review of the flying reptiles so abundantly available in the Museum. This too bore the imprint of the Cambridge University Press and was titled *Ornithosauria*. In this work, which is still a standard book of reference for the Cambridge Pterodactyl fauna, Seeley substantiated many of the names first published in the *Index*.

His days in Cambridge were, however, coming to an end. Adam Sedgwick was at long last about to relinquish his chair through death, and whether Seeley feared the prospects under his successor or was already straining at the restrictions of a collection very well known to him cannot now be said. At any rate he gave up his Assistantship in the Museum and came to London in 1872. J. E. Gray had recently invited him to join the Zoology Department of the British Museum and T. H. Huxley offered to recommend him for the Geological Survey, but he refused both.

The next few years saw him engaged in a fury of writing and literary work. No longer the scientific sponge accumulating the wisdom of others, or the museum hack learning by slow experience, he seems to have determined that the reservoir of his knowledge should be placed at the disposal of others.

The time was fruitful along three lines. Firstly, in 1872, he married. His bride was Eleonora Jane, the only daughter of William Mitchell, of St. George's Lodge, Bath.

The family of the marriage consists of four daughters, all still alive. The eldest is Maud, who married Arthur Smith Woodward, for many years Keeper of the Department of Geology in the British Museum (Natural History) and who was a distinguished Vertebrate Palaeontologist. He retired in 1924 and was knighted in that year.

In the year following the birth of Maud another daughter was born, Brynhilda, later known as Belinda. She took up art and her reconstructions and drawings of the flying reptiles, made to scale from careful measurements of the bones, are among the illustrations of *Dragons of the Air*.

Several years later a third daughter was born, Phyllis, whose interests in Geology enabled her to lecture for her father on occasions, and she was for a short time his assistant at Queen's College, Harley Street, London.

In 1883 the family left London for Sevenoaks where in the following year they were joined by a fourth daughter, Sylvia. She became scientific secretary to the late Dr. H. M. Ami, who founded the Canadian School of Prehistory in Ottawa, and for five successive summer seasons carried on excavations on the world-famous site at Les Eyzies in the Dordogne. Sylvia is now on the staff of the Journal of the Royal Canadian Geographical Society for whom she compiled the *Mirror of Canada*.

Each of these daughters has inherited in some degree some aspect of the ability of their father. All of them remember vividly the instruction they gained from him. The colour of the sky, the nature of the tides, the formation of sand, the constitution of rocks, and the erosive forces seen in every day life were all subjects on which, inevitably, he enlightened them. It is clear that all his life Seeley was the born teacher and he was fortunate in being able to attract so many born pupils.

The family home at this time was first in Sevenoaks and later in Kensington, and secure in the comfort of this, surrounded by love and devotion, he was able to produce a remarkable amount of work. This second aspect of these first London years saw the publication of many important books and names for fossils.

He was appointed to lecture for the Gilchrist Trust and for many years he lectured in most of the principal towns in England and Wales, once or twice in Scotland and Ireland. He, and Sir Robert Ball, the astronomer, were two of the most popular of the Gilchrist lecturers. Seeley's delivery was excellent and clear, whether he was speaking in a class-room or to an audience of 3,000 in some of the northern towns. On these tours he became very interested in the various British industries and he delighted to tell his children how some of the many things that he had seen were made.

In the early days of his lecturing he used scale diagrams, many of them drawn and coloured by Mrs. Seeley from text-books. Then came the use of a lantern and slides and soon after, the dissolving views. In lecturing on extinct types of life he continued to use diagrams on which he outlined the principal features in french charcoal bringing the bones into high relief.

With his widespread interest in education he came into contact with Miss Cons and Miss Martineau, who were running the College for working men in the Morley Memorial Hall, in what is now known as the Old Vic. Emma Cons's niece, Lilian Bayliss, who assisted her, arranged for variety turns to follow the scientific lectures which were given once a week by various scientific friends of Miss Cons. Miss Bayliss was not satisfied with variety but planned to bring Shakespeare to the Old Vic, and this desire she lived to see amply fulfilled.

Seeley was for many years a regular contributor to *The Educational Times*.

He was a leading authority on Dinosaurs and was responsible for the names Saurischia and Ornithischia by which the two main groups are now known. He made researches on marine reptiles and founded the genera *Ophthalmosaurus*, *Muraenosaurus* and *Cryptocleidus*. Pterosaurs still continued to fascinate him and he made further researches upon their anatomy.

His energies were even greater than needed for these studies and writings. In 1884 he completely revised (and almost rewrote) Phillips' *Manual of Geology*. In 1886 he produced *The Freshwater Fishes of Europe* and in 1887 he wrote *Factors in Life* for the S.P.C.K. and began the great series of papers in the *Philosophical Transactions of the Royal Society* sometimes classed together as *Fossil Reptilia*, 1887. The third facet of these years was the preparation that they gave him for more permanent and influential employment. His talents were widely displayed and it soon became obvious to many in the academic world that here was a man worthy of their mettle who was fitted to share the professorial benches with them.

In 1896, Seeley was appointed Professor of Geography in King's College, London. If at first it seems that his studentship in the law and his assistantship among Cambridge fossils formed a strange prelude to this Chair, experience soon proved him to have a new approach to the subject and a considerable appeal to the students. He explained Geography to his hearers much as afterwards he explained natural events to his growing children. He analysed the subject, dealt succinctly and simply with each aspect and reassembled the whole in a logical and instructive manner. By starting his course with geomorphology he at once formed a logical basis for his science and set a pattern for his successors.

Soon his geography class became well known and he was called to be Professor of Geography and Geology (whilst still holding his King's College appointment) at Queen's College in Harley Street, London.

His long voluntary experience in popularizing now stood him in good stead, as generations of his students have testified. He had also a capacity for hard work. Three simultaneous chairs did not sap his energies; rather they increased his opportunities.

In 1881 he was Dean of Queen's College. Ten years later, still busy in his professional duties, he was still looking for fresh fields of teaching endeavour and in 1890 he had become Lecturer in Geology and Mineralogy in the Royal Indian Engineering College at Coopers Hill, succeeding Martin Duncan as professor in the following year, a post he held until the College was closed in 1906.

Even so he was still carrying on a vigorous public lecturing programme between 1880 and 1890. In 1885 he founded the London Geological Field Class of which he remained the Lecturer and Leader for twenty-one years. In 1891 he produced a most useful *Handbook of the Geology of London*, primarily for this group.

In 1896 he succeeded Thomas Wiltshire as Professor of Geology and Mineralogy in King's College, thus joining this Chair to that he already held of Geography. This remarkable duality was his until his last few months in 1908.

Yet this narrative of his academic record and duties, speaking as it does of endless preparations, meetings, lectures, demonstrations and field classes, conceals one of his great achievements and the beginning of a new phase and interest in museums and universities in Britain.

If we turn back the clock and look again at that *Index* he produced on Woodwardian fossils, we can read on p. 136 the following few lines:

> . . . " Fossils from the Alexander River, South Africa.
> 1 cast of skull of Dicynodon lacerticeps (Owen)
> 2 cast of skull of Dicynodon testudiceps (Owen)
> 3 cast of skull of Dicynodon strigiceps (Owen) " . . .

These were but casts and of forms that had already been fully described by Richard Owen in 1844, 1845, and 1855 respectively under the names given in the *Index*. (The author's name should not therefore be in brackets.) All the type specimens were then in the British Museum at Bloomsbury and are now at South Kensington.

It is unlikely that the casts themselves stimulated Seeley to explore the wider fields of the Karroo but during his tenure of multiple professorships, he must have become aware of the growing tide of material that was being unearthed in South Africa and which bore witness to a vast new fauna.

Most of the specimens were being discovered accidentally by farmers turning over their soil or observing the materials washed out in dongas (or gullies). It must have become increasingly obvious that a determined collector could obtain large and related series and, knowing the stratigraphical and osteological environment, could contribute to a more satisfactory understanding of the whole.

It was precisely this that Seeley determined to do, with of course the general picture of geology and geography in his mind. He prepared a scheme which found official favour with the Royal Society's Government Grant Committee so that he was enabled by a grant of £200 to visit the reptilian fossils in St. Petersburg and Moscow and then to proceed to Cape Colony to make his own observations and collections.

Fortunately, through the care and kindness of his family, the series of characteristic letters that he wrote from Africa is preserved. With the exception of a few paragraphs of family interest these are printed here for the first time. They constitute a unique record both historically and geologically and throw valuable light on some of the fundamental fossils in the story of reptilian and mammalian evolution, besides shedding some interesting side-lights on the South Africa of that time.

The spelling and punctuation have been left as they are in the originals, but the numerous geographical and geological sketches with which the letters were peppered have had to be omitted, except those of actual fossils.

POSTE RESTANTE
(CLARIDGES HOTEL,) CAPETOWN,
26 July 1889

My darling wife,

I was very glad to get your letter, and Mauds and to hear all your news. I got it this Friday evening after spending the afternoon with Dr. Gill at the Observatory. I find that his is an admiralty appointment so that he is quite independent of the Parliament, and he is evidently a very able man. He told me that he had always been of a mechanical turn making clocks as a boy and using his hands, and narrated that dining once with Huggins he met Naysmith, and that they travelled together in an omnibus, when Naysmith got out, and at their journeys end the 'bus man demanded payment for Naysmith. Next morning Gill got a letter from Naysmith stating that he had placed £1000 to his credit for astronomical apparatus. And on calling to thank him and ask to what he owed this singular liberality, Naysmith replied, " to your thumbs sir ; for I felt sure that a man with such thumbs would be able to use the money to good account for the purpose which I intend." The Gills are delightful people, and I spend next Sunday afternoon there. I met there Dr. Elbers, secretary of the Berlin Academy, Captain Pullen who is going to survey the west coast, and after lunch a number of ladies and gentlemen who called. Dr. Atherstone told a capital story of Sir John Hershell who had been unable to get any potatoes out of his garden, on account of the Depredations of the Blue Mole, which is a large animal like a rabbit. So Sir John determined to try, and eat the moles. It happened that day, that they had had a present of a leveret, and Lady Hershell ordered that to be served at a separate table for herself. So Sir John and W Maclean sat down and cut daintily, and presently the saliva began to appear at the corners of Maclean's mouth, and Sir John pressing his abdomen said I feel uncomfortable MacLean ; we had better have the mole taken away at which Lady Hershell derided them. So they rang the bell, and asked the coloured servant to take away the mole, when he went to Lady Hershells table and lifted the dish. Not that, you rascal, said Sir John ; I said take away the mole! But *this* is the mole, said the boy.—I have heard Sedgwick tell the same story, so I have no doubt it is genuine.

The observatory is magnificent and they are building a special house for photography. We saw all the apparatus.

The Dutch boors have a great sense of humour, and over dinner tonight W de Smit told some funny stories. Thus a farmer was drowned, and on it being told to his son, the son says " O dear, and he had my new pen knife in his pocket ". The Dr. relates that a Hottentot was going to be hanged at Grahamstown while he was surgeon to the convicts, and on being asked his last wishes desired a new pair of white trousers because a good many women who knew him would come. Further asked if he had no other wish he said a pipe of tobacco ; this the jailor handed him while the priest was praying, when the man handed it back saying jailor you have forgotten to light it. Presently the pipe had to be thrown down. But it happened that the rope broke, when the man picking himself up said, what a nuisance it is, it has put the pipe out! I hear that up country coffins are a comodity in great demand, and Atherstone mentioned that one man had made many coffins and bitterly complained that all his friends had borrowed them. Now, he added I have made a teak coffin, and you don't catch me lending that to anyone! Delirium Tremens seems to be a common ailment among the Dutch and others, and de Smit told how people systematically give directions for their recovery, and then drink till they become insane. On one occasion he found the Commissioner, Assistant Commissioner, and Doctor of an up country district all in this state ; and on another occasion the Dutch farmers wife become pious with drink was praying half the night that the almighty would not be very hard on her, for she had not occasion to come to him often, and it was not often that she kicked over the traces, and as only a thin partition separated the rooms Smit could not get to sleep. Dr. Atherstone mentioned that in his earlier practise a girl had fallen down a well in process of construction and dashed her brains out and that he recovered her happening to be passing as a plumber brought her to the surface, and said that the bones were entirely destroyed, but that eventually new bone grew, and that she is now married in England, and is a well known musical composer. Laurance Oliphant was a native of the Cape.

The time passes rapidly. I mentioned in the last letter my discovery of a mammal but whether it is from the Karroo or from some newer deposit is uncertain. I have found the distal end of the femur and proximal end of tibia of a mammal mineralized almost as perfectly as the Karroo specimens which are certainly the remains of a huge proboscidian far larger than the African elephant but closely allied to it. I can have no doubt that these are tertiary fossils, and they make known for the first time the existence in South Africa of rocks which are probably identical with the Siwalik beds of India and which may yield as important a fauna. But where are the rocks? It may seem incredible, but it is a fact, that there is no history to the specimens ; no one knows anything about them, and the miocene tertiary of the Cape have yet to be discovered.

Another discovery of some interest is a new Saurian from the Fraserburg district, collected by Mr. Bain. Of course I have nothing but a *badly* preserved skull. But such a skull that I do not know how to group it in any of the many divisions which I have made. It is about a foot long and has a mammalian aspect but is a true reptile (Text Fig. 2).

It is a new genus. The last day or two I have been chiseling at another vile Fraserburg specimen which proves to be a large labyrinthodont, with the rami of the lower jaw expanded transversely so as to cover all the palate except the median parasphenoid bone. There are *no teeth* visible at the sides of the jaws and therefore I infer that I have an animal with crushing teeth like Placodus. Unfortunately the upper surface of the skull is so badly preserved that it does not show one of the natural apertures, and is only clear about the articulation of the quadrate with the lower jaw. There are hundreds of specimens but it is difficult to make much of them though I should have been keener about them if I had not had such fine material at home.

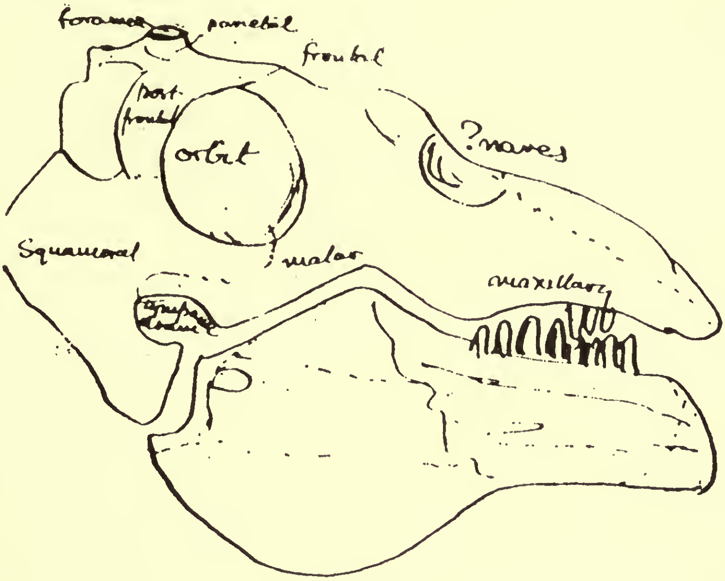

FIG. 2

Last Wednesday I dined with Mr Sidney Cowper at Wynberg and took a two horse covered cart to drive from the station to his house. The nigger drove me about à la Tony Lumpkin, till I got down and inquired the way at a shop. The ladies were stripped as much as black silks would permit although it was the depth of winter, and to their senses cold. On Thursday I called at the Government house. An A. D. C. returned my visit at once, and on Friday I went to the reception by General and Mrs Smyth ; as she spoke of their friends Flower and Warrington Smyth. I have no doubt the Deputy-Governor is Sir Warrington's brother. I am invited to Dine with them on Friday. Events succeed so rapidly that I cannot remember half the things that happen. I have been to taste Mr. Stockdale's wines. He possesses 250 square miles of land in the wine district and is a brother in law of Atherstones. Sir Charles Mills sent me an introduction to the Premier to Lisbon for the Mexican which however arrived too late, and was brought on by the last Mail. Saturday is a half holiday, and I utilized it by going to sleep. This Sunday

I went to the Cathedral in the morning and found myself sitting next to Mr. de Jongh who came out in the same boat. I then went to Rondebosch. Had a few words with the Premier on the Platform, and at that station Bain met Atherstone and myself and drove us to his home where we dined. We were driven thence to Rosebank, made calls, and came on by rail to Observatory Road to spend some time with Gill. I unfolded to him my scheme for a Geosophic survey of South Africa and I am going to see him again on the matter on my return to Capetown. He estimates that it would cost £4,000 a year as I have sketched it. In view of this I am proposing to see the Diamond Mines of Kimberley, the gold mines of Knysna, and some coal mines in addition to the Dragon Rocks, since the Prime Minister cares about nothing but practical aspects of science. I should like you to send a copy of *Factors in Life* with a list of my papers enclosed, to Dr Gill, F.R.S., Astronomer Royal Observatory Road Cape Town. I gave one of the Factors to Dr Atherstone the other to Sir Gordon Sprigg, K.C.M.G., who was once a shorthand reporter in the British House of Commons. I find that Trollope travelled with Dr Atherstone and Atherstone tells me that Trollope used to write his notes day by day and send them to his wife who lived in Switzerland and that she put them together and wrote the volumes of his travels in the form in which they appeared immediately on his return.

Stockdale I find once possessed the diamond mines of the Cape when the country belonged to the Orange Free State immediately after the working began. The farm belonged to two brothers, Dutchmen who abandoned their holding when the diggers came. Stockdale found one and bought his share for £1,000. He then went in search of the other and found him six days up the Orange River with all his sheep lambing, and his wife within a day of her confinement. He was a difficult man to deal with being a dopper, whose yea is yea, and nay nay. So Stockdale helped him with his sheep and he asked eventually £6000 for his share of the farm. Stockdale took half an hour to think of it, and eventually agreed to pay him £5600 in a month. His representatives afterwards sold the property to the British Government for £100,000 ; and now £600,000,000 would not buy it, so he feels rather sore that the British Government stole the land from the Free State. He showed me a series of beautiful drawings of the edible fishes of the Cape made by the Drawing master who teaches his children. He tells me there is very little money in the country as money is understood in England,—very few people with as much as £10,000 a year ; but also there are few very poor. I hear from Mr Wilmot the Editor of the Excalabur, that the Dutch are the Aristocracy, and hold most of the land. And so far as I can judge there is reason to think the discontent with the home government is rather with the English than with the Dutch, who are ultra conservative.

De Smit who is charged with stories, as dry as the Karroo, told me of a Hottentot who complained that his chief had used him very badly, and went to the Missionary. It seemed that the poor fellow had been kicked out of his house, and his girl had been taken away from him. The missionary promised that the chief should have punishment in a future state. Oh no said the Hottentot that won't do at all for perhaps he will be converted, and then he would escape punishment altogether ; so punish him now.

I went yesterday to Sea-point by tram. It is wonderful to see the profusion of winter flowers while the hedges are made of the dark green grey Aloe, with its many vermillion heads of blossom, growing right down to the sea with the mountains rising close behind. Every day I find some little new thing. Yesterday it was the teeth of a mammal or mammal-like reptile, with crushing teeth with many cusps, exactly of the mammal type. But the skull had evidently crumbled. I also found in the museum a tooth which in England we should have called Elephas primigenius but which may be E. Indicus from some superficial deposit. A new fact in any case. I have also comparatively slender limb bones of Dicynodonts like crocodiles only the radius is large and the ulna small as in mammals. Last Friday I went to the Lower House and sat in the Distinguished strangers gallery to hear a debate on the County Councils bill. I believe I am to give a lecture next Thursday on the Dragons of the Great Karroo and Drakensberg to the Young Mens Christian Association with His Excellency the Acting Governor in the Chair. Tomorrow I am going to lunch at the Observatory, and then go to a meeting of the Philosophical Society in the Evening (Wednesday). Today has been wet and windy. The winds which come from Table mountain are terrific. South Easters bring sand down in columns. The marvel is that the trees do not snap. Anything less like winter you could not imagine, so I fear that summer must be hot. I do not know that it would be possible to settle here, but you will have to think about it, if the Government should eventually ask my co-operation. I have conceived of a central Museum with a survey always going on of which it is the index, and a correspondence department for distributing scientific advice to the colonists. It would keep the Director very much in the open country, and away from home, making his maps and writing his reports ; but it would be doing the best thing which has ever been imagined for the development of Cape Colony. You spoke of sending me papers by book or parcel post. They have not arrived. I should like a few copies of my list of papers.

Everyone here has an open eye and talon for the main chance. de Smit says the Grace before meat is almost interminable in a Dutch boor home and the moment it is over everyone drives his fork into the dish for the bit of meat on which he has fixed his eye. It is a type of everything. Everyone for himself and no one for the Colony.

Next Wednsday I shall be up country at Fraserburg, and my letters will now become more irregular.

Thy loving husband
H. G. Seeley

CAPE TOWN

My darling Wife,

I was glad to get your letter with Enclosures from the children. Just after closing my last letter the Geol. Mag. and Castle book came having taken a week to get delivered owing to the curious law that printed matter cannot be intercepted here but must first go to its destination. I went out to the Observatory last Wednesday and discussed with Dr Gill the financial aspect of my Geosophical Survey. He has £800 and a house. He says I should have to pay £120 a year house rent, and he thought that as the heads of departments here receive £800 to £1000 a year, that I should probably have £900 a year. He went into all matters: the ages of the children, your feelings in the matter, &c. In the evening I went to Rosebank station to see Mr. Allis a photographer who was intimate and related to William Saunders of Bristol, and got some idea of the interior of the country. He is going to make me a few slides for the lantern, but his charges are very high. I came in got a hurried meal and went to the Philosophical Society. There was an interesting paper on sand-dunes upon which I made a small oration. Thursday I went to the General's reception and he asked me to drive down to the Y.M.C.A. with him, and dine with him first. So I dined and Mrs Smyth and the A.D.C.'s went to my lecture on the Dragons of the Drakensberg. I had a distinguished audience, but they have omitted the lecture from the newspaper's report, and have only given something from its head and tail. I returned to Government house after the lecture, and found Captain Baden-Powell drilling his choir of magpie minstrels in the great drawing room. Excellency was exceedingly kind; and I find that Mrs Smyth is sister to the wife of my old College tutor at Sidney Sussex J. W. C. Ellis. I forgot to mention that Dr Gill in seconding the vote of thanks hoped that the Colony might soon have the advantage of a Geological Survey, and that when I next came to the Cape, I should be tempted to remain. So you see, matters are advancing. This morning an old Sidney Sussex man Revd Wm Tobias a converted Jew who I knew at Cambridge came to see me. He is rector of Beaconsfield which adjoins Kimberley. I have arranged my trip with Mr Bain. But I do not know whether Dr Atherstone will come. He wants the Government to pay him two guineas a day and his expenses for accompanying me, and as the Government is doing so much for me I do not like to press it, and yet the old man's evidence is very valuable. As the Colonial Secretary was in the House I saw the Under Secretary Mr Willis, and delivered to him my itinerary. He will write to all the Commissioners to prepare to receive me and Mr Bain and Mr Sidney Cowper will telegraph to them at all the places to which I go to get ready to give me help. Mr Bain tells me, he proposes to draw an advance and get his work passed on his return as the simplest way of providing cart hire &c. I think there is nothing more in the Museum that will repay work, at present. I dine tonight at Government House with His Excellency the Administrator, and tomorrow I lunch with the Prime Minister at Rondebosch, where he lives. Dr Atherstone has been seriously unwell with a chill. The dinner tonight was a grand full dress dinner brilliant with military and naval dress uniforms which I had never seen. The French consul, a German naval Captain, Mr. Fairbridge a trustee of the South African Museum, with his wife and daughter who of course claimed acquintance as an old pupil of mine at Miss Haswell's, and of course remembered that she had only 60 marks in the examination while two other girls had 95. This is the rotundity of the world. An Engineer officer building fortifications, du Bouillac, gave me an account of a living animal of the form of the plesiosaurus which chased seals, which he saw in Simons Town Bay and approached within 15 feet, when it dived under the boat. The Fairbridge people have asked me to dine with them on Sunday, but the old gentleman has so much energy that unless I can get Dr Atherstone to go with me, I am afraid he will be rather exhausting. I have gone over most of the materials in the Museum and am amazed at the poverty of the Geological and mineralogical collections. Parliament has just granted £4,000 to build a new wing ; and Dr Gill suggests that it should be built in accordance with my scheme so as to arrange eventually for a quadrangle with the Library one side, an industrial museum parallel to it, the recent collections on one side, and the fossil and mineral collections on the other.

At Sir Gordon Sprigg's I met Lady Sprigg and her two daughters, Mr Hofmeyr who controls the ministry and is the head of the Africander party, Mr. Blake, Mr Fairburn, Mr and Mrs Norton and Mr Pearson. The conversation was on Leprosy, Winds and sand dunes, the Museum, and such like topics. After lunch I went with Gill to the Observatory to smoke. He told me that Sprigg has no means and depends upon his official salary. Sir Thomas Oppington is always hopelessly in debt, and is without political principle. He is Attorney General. Mr Tudhope the Colonial Secretary, has been in business, has been newspaper editor and bankrupt again and again. Col. Schembrucker has not a farthing, and sticks to office at any price. This is the ragged regiment of a Colonial Ministry. The Government was constructing a railway to British Bechuanaland, and were compelled to the influence of Paul Kruger the President of the Transvaal, exerted by Mr Hofmeyr to give it up and make a railway to Bloemfontein instead, because the other railway would have brought British troops to the borders of the Transvaal and the Government has so little independence that instead of going out, they gave up their railway and stuck to office. So far as I can judge Hofmeyr is a man of little education, though he is astute. The best thing I have heard of him is his proposal to include all the South African Governments in a Customs Union. This is sound policy, and the single gleam of Statesmanship, among the cloud of time serving and self seeking schemes. Here it is every man for himself, and no one for the country. I think the soundest practical policy will be to endeavour to educate Hofmeyr who alone has a strong following, and who will not take office. I heard on Saturday that the Government propose to allow £55 for cart hire for me to get about, £15 for conveyance of specimens to railway stations, £15 for Mr Bain's personal expenses, while they give me Mr Bain's services for 40 days. While all specimens are to be sent free by rail O.H.M.S. Is this not generous? I find Dr. Gill will pave the way with the Prime Minister for a statement from me, on my return as to the importance of developing the Geological and Industrial resources of the Colony, and we are quite agreed that nothing but a Geological Survey can prevent the tail from wagging the dog,—in other words can prevent the Transvaal from absorbing Cape Colony sooner or later. On my return Dr Gill proposes to arrange a meeting at the Philosophical Society and get the ministers to be present so that I may say all that I have to say on the basis of personal experience in the Colony. Mr Wilmot, the Editor of Excalabur, wants to publish my lecture in full as a supplement to his paper but of course I have no notes. This morning Mrs Smyth sent me a note from Government House asking me to lunch or dine with them today, as it is my last Sunday. Tomorrow night I start up country. The first stoppage will be at Prince Albert Road to which I return after traversing and crossing the Zwarte Berg range. We then go on to Fraserberg Road station, and spend three days fossil hunting, then to

Beaufort West all in grand mountain scenery with superb passes, through which Bain has constructed the roads. We then go by cart over the country to Aberdeen and Graaf Reinet, and so on to Cradock. I believe we then come down to Grahams Town where I may lecture. I shall then get up by Queenstown to Aliwal North and Burghersdorp, and then up to Kimberley. Then back by Rail to Cape Town. I think I have quite got over the excitement of the newness of the country, and feel in sound health. The lower temperature of the last few days has contributed to this, not less than the sense that there is nothing more to be done in Cape Town at present. There has been heavy hail here, and I hear that the mountains yesterday were white with snow.

I sincerely hope you are all well and happy. You will see from my letters how I have been thinking of you in a practical way, and I trust it may be that we shall someday come together to the Cape, though it is much which we should leave behind, if I should be offered the appointment which I am trying to create. What you say is very true about Miss Schmitz and Kings and my work at home, but I could do no more than I did. And here all my efforts have been concentrated on diplomacy to secure the future provision for you and the children which I do not see at home. I will do what I can for Rix.

Thy loving husband
H. G. Seeley.

OUDTSHOORN
CAPE COLONY
7th August

My darling Wife,

On Sunday last I dined at Government House Cape Town at 8 o'clock. There was no one but His Excellency, Mrs Smyth, the 3 A.D.C.'s and myself. They are charming people and nothing could exceed the friendliness of their manner and expressions. I had great difficulty to get ready for the start on Monday. But at last at 8 o'clock at night I found myself at the Railway Station. Before starting I got letters from the Superintendent of Railways that a special compartment was reserved for me and Mr Bain ; and from the Government enabling me to frank all fossils as on the Government Service (O.H.M.S.). Mr Bain's son and his wife came to see us off. And as the train started it was greeted with cheer after cheer as it left the station on its way to Kimberley. We passed over the Hex River Mountains which were covered with snow and through striking mountain country, and talked till nearly 1 o'clock, when we got a cup of coffee at a way side station and went to sleep, in our clothes and wraps. We got a good breakfast in the morning at 7 o'clock, and at about 1.30 arrived at Prince Albert Road 2500 feet above the sea, and 200 miles from Cape Town. Here I posted my proof to Rix for the last Mail. And then leaving most of our luggage we started in a two horse covered Cape cart for the 30 miles drive to Prince Albert. We were on the Karroo Plain and before stretched the great range of the Zwarte Berg towering up in endless peaks with its surface scored by endless gulleys and valleys. It was a wonderful drive for me. For the surface was covered with stones as it had been from the Beginning. We stopped to examine limestones and other rocks by the way and to note the little pyramidal hills called Koppe's. The Karroo bush and a few thorny mimosa's were the common vegetation. At the halfway House we outspanned and had some excellent Java Coffee. The old Dutchman showed me little bits of green copper ore which he had found. He had seven children, had lived there 5 years and his eldest daughter who had a complexion like *very* dirty linen told me they had had no rain since September last, and that they could grow no crops. Nevertheless the goats looked grand, and Bain told me that after rain the vegetation grows almost beyond belief, and the animals fatten in a week or two. We inspanned and went on to Prince Albert which lies at the foot of the Zwarteberg to which we descended, getting in by moonlight in a cloudless sky, not inconveniently cold. After Dinner the Commissioner waited upon me and said he had received a telegram from the Premier and Letter from the Colonial Minister to aid me in any way possible, so he told me of search for coal and of the fruit industry of the place, and other matters. At seven o'clock this morning we started with 4 new horses to cross the Zwarteberg by the new road which Mr Bain had made over the pass, which was opened 15 months ago. It is a wonderful work like the Gemmi only much better, made by convict labour. He says the convicts become so skillful that whereas they were only worth 3 pence a day when convicted they readily earn 5 shillings a day when discharged, and the only recommendation the farmers require is evidence that he has been a convict. We saw a wonderful rock called Trap-conglomerate on leaving Prince Albert, full of rounded bounders. And on entering the pass the rocks on one side were golden with lichen. They dip to the south, and soon become folded and contorted almost beyond belief. Up we went and outspanned at the only house, near the summit or neck of the pass, between 5,000 and 6,000 feet above the sea. Here we got some coffee and Bain produced corned beef and bread, butter and other accessaries from his bag. There was a little snow at the top and all the way up, the ruins of successive convict stations, which are unroofed as they are abandoned because the roofing is corrugated iron. We inspanned again and went on with two horses which overtook us as we descended a little into the Oudtshoorn valley, which is the richest part of the Colony, well cultivated and full of fruit. Many teams passed us. One of 22 oxen was going to take a waggon load of oranges into the Transvaal. Here and there was a dead ox, killed by the cold.

We looked away to the North over the Karroo and saw seven parallel ranges of mountains stretching below us, limited by the Neuwfelt range 90 away to the North standing out clear as possible on the horizon. On the south side stretch the Cango Hills, which are for the most part rounded limestone beyond which are the Otoniqua range. The happy valley was everywhere well cultivated. We descended lower and lower and passed the celebrated Cango caves but had no time to visit them. The stalactites are formed of white Baryte. We outspanned at the Kango arms where they charged a shilling a cup for coffee. And then passing many tobacco sheds where the leaves were drying we entered a narrow valley called Schoemans Poort and examined the wonderful metamorphic rocks, limestones formed of limestone pebbles but full of black and white mica, slates showing cleavage, sandstones full of rounded boulders of all kinds of old rocks, and quartzites—the latter traversed by quartz veins, which we afterwards heard that gold had been found. We saw orange groves in full bearing with 4000, to 8000 oranges on each tree, mandarin oranges called Natje, and citron from which the people make an excellent preserve. The best brandy is made in this country, for there is no railway, so the people will not make wine. And the demand for sigars is far beyond the quantity they make. The tobacco sells retail at 4 pence a pound. Cigars at 10 shillings a hundred, though at local hotels they are 3 pence each. We afterwards passed forests of Prickly pear which is over-running and ruining large tracts of country Mr. Bain showed me the Kaffir antidotes for snake bite, and other plants which are used as remedies for kidney and other disease. At length after a 45 miles drive we reached Oudtshoorn by moon-light. It is a fine township with the best hotel I have yet seen. Here was Mr Bain's daughter and her husband Mr Bromley who was at Rondebusch when I dined with Mr Bain. We talked with intelligent Transvaal and Australian diggers, dined well, tasted the delicious cape gooseberry jam which is eaten with custard, and the dried pears which are first peeled and salted. All kinds of fruit are dried but the supplies of the year were all sold.

As on board ship they bring a cup of coffee to your bed room in the morning. We got up at 6 started at 7 with two stallions. We outspanned at Hassenjacht where we breakfasted in the open air. There was to be a sale of sheep and goats and many Boers had arrived. They boiled some water and Mr Bain made coffee and produced breakfast of corned beef, bread, and oranges. We had left the butter on the top of the Zwarteberg pass. We were now on our way to recross the Zwarteberg by Meirings poort, through which the Oliphant river flows. We next outspanned at the entrance to the Poort at Rankin's and got coffee and eggs, telegraphed for letters and bought a pipe made of the Protea a red wood which looks like a fine plait. Here the slaty rocks have an uncomformable bed on top. The poort runs N. and S. and consists of rocks folded over each other very cut through by the recession of a waterfall. In the middle of the pass we diverged to examine a waterfall, which comes down into a rock basin, and is now excavating a gorge for itself. The pass is 10 miles long and say 2,000 feet deep where deepest At night we reached Klaarstroom = clear stream, after a ride of 36 miles. It is one house with a shop at the north end of the Poort. Looking back from it you saw the gap in the southern mass of the Zwarteberg separated from you by a low range of hills which seem once to have dammed up a lake. We had goat for dinner and citron jam or rather preserve. The house went to bed at 9-30. We got up at six, when a girl brought us coffee in bed, started at seven and outspanned in Blumendal by the graveyard which adjoins the road has no tombstones and only marks the spot with a layer of rounded stones gathered from adjacent land. We gathered sticks and Mr Bain made a fire, boiled a kettle, and soon made coffee. We got some capital bread at Waarstrom and sat down to breakfast. All day today (Friday) we have been travelling along the strike of the Zwarteberg, so that very little geology was to be seen. We stopped at a farm and bought 50 oranges to take into the Karroo, but here far from anyone they charged 4 shillings a hundred. The daughters climbed the trees and got them down and I found the fresh ripe mandarin orange excellent. Mr Bain showed me some medicinal plants. Gawzabosch or Duck-plant is in great repute as a cure for cancer, and as a family remedy for most things. The leaves and flowers are infused as a Tea. It looks like a sort of vetch but grows as a shrub, it has a flavour as I found like rhubarb only much more pungent. A favourite cure for snake bite awarded £500 by the Indian Government to a man who learned it from a Kaffir is Wilde-Dagga called wild-hemp. It is Leonotus leoneurus. The covering of the roots, or leaves are infused and a cup taken every half hour. Kruid-je-roer-myn-niet is another potent cure for snake bite : its name means ‘ touch me not or I strike ’. We outspanned at du Pleisses' farm where we got some coffee, and came finally to the entrance to the Zwarteberg pass where the rocks are much disturbed.

We are now back at Prince Albert. Mr Haak the Landlord who has been the round with us has got us some dried fruits and tomorrow we start for the Karroo and its bones. The silk bark is a curious tree which seems to have fibre like silk in its bark and leaves.

Thy loving husband
H. G. Seeley.

TAMBOER,
28 miles N. of Frazerberg Road Station,
11th August.

My darling Wife,

. . . Here I am in the desert. It is marvellous. A land with rivers in which there is no water, a country without grass or trees, with the surface covered with stones and stunted bushes, generally level but with parallel ranges or low hills, with the naked rock often bare on the surface. Here there has been no rain for six months. The farmers often build dams to collect the water, but years pass without water falling to fill them.

Saturday morning we left Prince Albert at 7 o'clock as usual. I noticed the high incline and folding of the rocks as we jolted over the many little ranges of hills formed by the strata dipping to the north. After 15 miles we outspanned at Bote Kraal where the daughters cooked us sausages and breast of pork with eggs, excellent coffee followed by marmalade and good bread with Karroo butter which is fat from the great tails of the Cape sheep. These animals are full grown in a year ; and in the dry season when there is no feed they live on their own tails in a way comparable to hybernating animals. We inspanned and then began an exciting race to catch our train for Eclipse and Polly the poor starved horses were worn out with work, and they stopped at every little ascent, and then on the level and had to be led, and rested dozens of times. We were carrying the Mails, and I never saw such a flogging to get them in time. However it was done and in the 28 miles, I am sure the animals did their last effort, for we had to rest them every 60 or 70 yards. At the station I met Mr Norton and Mr Douglas members of Parliament going home to Grahams Town, and at Fraserberg Road I got your letter. Here I found myself quite thirsty with the excitement over Polly and

Eclipse. Mr Marais who only speaks dutch was here with two carts and capital horses to bring us to Tamboer which is a 28 miles drive, so that we had nearly 60 miles cart ride. We arrived about 9.30 at night, travelling under the full moon and drawing near to the Nieuwfelt Mountains. This house stands quite alone in the Karroo, and yet it is a post office and a general dealer's shop and the home of a large farmer. We had supper and then went to see two fossils which had been got for us. One is a fine skull of a large new Labyrinthodont, shaped exactly like the head of a crocodile only the back of the head is much higher; it is about two feet long. The other specimen is a beautifully preserved skull of Pareiasaurus without the upper part. This Sunday morning we went on to the roof of the house and saw nearly the whole vertebral column of the same animal but without the limbs. We rested this morning and drove out to Cypher where a Hottentot had been sent early to find some bones which were known to be there. We came upon a reptilian graveyard with the bones in the rock, and got out some beautiful limb bones with some few vertebrae. The remains being scattered in the rock though apparently all in a yard or two. But still there were no small bones of the extremities except an ulna. We chipped out another skull but could make nothing of it, and it was much broken in extraction by the Hottentot. But it is a new beast. We made a substantial breakfast of sausage and grilled breast of pork and eggs. Mr Marais brought a large water bottle and later in the day made us coffee in the velt. I marked the more important bones with vermillion, so that the pieces may be eventually fitted together and we loaded up. We came back to afternoon dinner of the tenderest Karroo mutton eaten with cabbage and a salad made of beetroot and sliced onions cut very thin. We drink water, which has the colour of water in a milky jug. And concluded with coffee, ending as we began with a long grace in Dutch. In the evening before sunset I went out to the velt to see a few bones which one of the herds had put together in a heap but though they were interesting to see I did not think them perfect enough to bring away. This country was formerly densely peopled with Bushmen with whom there were many bloody battles till holding the impregnable height of Tafelberg in the Nieuwfelt range the Boers crept up on a dark night as they afterwards did at Majuba Hill and shot down every man woman and child as they came out of their Kraals. For a long time before a Boer always shot a Bushman if he saw one, and a Bushman always shot a shepherd and drove off his sheep to the mountains. But it happened that a shepherd dozed in the afternoon, and the bushman crept up with bushes so that he was not seen, till the baboons were trained to defend them. They are tamed and were taken to the farm and as they never sleep in the day saw the Bushmen a mile off; and shepherds with baboons escaped while the others were killed. I tasted the Cambru formerly the food of the bushmen. It is very like a sweet tender turnip in flavour, has the form of a parsnip and varies with the form of the stones in the ground in which they grow. They may be six or seven inches in diameter and a foot and a half long. All over the country are Bushman digging stones, fragments of Bushman pottery, and in every rock shelter and cave, Bushman drawings of men and animals. The names of people are largely french, but they have forgotten their origin and speak Dutch, or rather Cape Dutch. All Boer hate coloured people. A missionary at Frazerberg asked the minister of the Church if he might have an evening service for his Hottentots on an evening when the Church was not used. The matter was referred to the Vestry by the minister. But they were in a mighty rage that their own minister should propose the defilement of sitting in a seat which had been occupied by a Hottentot. The minister said to the loudest of the opponents I suppose you will allow that a Hottentot has a Soul, at which there was a grunt of doubtful assent. And suppose the Hottentot saves his soul and dies and becomes an angel in Heaven, and that you afterwards die, and are told to sit down beside that Hottentot, what would you do? To which he replied " I'd be damned, if I wouldn't fly out of Heaven ". The Bushmen recognise their inferiority and say God first made the Baboons then themselves and lastly the white men. They call the Baboons the old people, and say they can talk as well as themselves, but are much too clever for they know well enough that if they did the Boers would set them to work and that they would have to wheel barrows for the rest of their lives. I saw some Baboons in Meirings Poort, but no great Troops. You would be amazed to see the fields of melons wild and bitter and useless, but I am told that in Namaqualand wild water-marrow furnishes the only drinking fluid, and that even Lions seek it for drink.

Here the Tea is mountain tea prepared from the leaves of a leguminous plant which grows in the country, especially in the Zwarteberg. Our last view in that range before returning to Prince Albert on the 20 August showed a double unconformity. The flat topped hills are I believe all of Basalt.

This morning we were up before the sun as usual had our coffee and then breakfast, before eight so that we started soon after in a SW direction for Bad. Here we took a Hottentot who was dressing a goat just killed. The animal weighed about 70lbs. He looked like a demon with his burnt sienna skin and broad flat nose, though he shook all over with a kind of palsy. Finding he was of no use we took his son, who had a bad impediment in his speech and he was as stupid as his father for he wasted our morning walking round the stony hills seeking for a fossil which we did not find. Mr Bain gave the duffer a shilling and we went on to Finders Fontein to see the reputed quicksilver spring. There seems to be no doubt that a little liquid metal was formerly found. But all that we saw was the most fearful sulphuretted hydrogen spring which I have heard of. The flavour of the water was indescribable, and I do not know when I shall get the stink out of my nostrils. I noticed that the spring in running away deposits a black powder. Mr. Bain got the Hottentot farmer who lives there to fill a bottle with this for analysis, and took samples of the rocks which I expect will yield antimony, bismuth, or silver. Mr Marais made us coffee and we resumed our journey back to the Bath. The farmer drives up inclines in the rock of 1 in 2½, without roads, up steps in the rock six inches deep over stones looking as though heaped before making a pavement. The ground is usually reddish brown, or grey brown :—sometimes greenish so that it looks at a distance as though covered with winter grass. Where this fine shale is found it is often rippled by the wind. Here and there is a bright scarlet aloe spike of blossom, or a bush in yellow flower, or a green mimosa with its myriads of dagger thorns, but for the most part stunted bushes eaten down by the sheep. We met one farmer trecking, trying to save his flock by going to a district SW where there has lately been some rain. The want of rain I believe to be due to the wholesale cutting down of trees. Everywhere you see trees peeled of the bark. The farmer allows the bark cutter to take a load of bark which destroys about 70 fine trees, for a sheep, which is worth about 7/6d (seven shillings and sixpence). When remonstrated with he says there will be wood to last his time. No one plants, because the tree might not be of use in his time. Yet when the lambing time comes and he has 5000 lambs say, he will cut the throats of 2000 or 3000 to save the ewes ; and I believe he might save all these if he would preserve and augment his timber.

Arrived at Blu Kop, Mr Marais brother's farm. We had mountain tea, took him up and started for another saurian it proved a good one head body tail and limbs all resting right way up as the animal died. The small bones of the extremities were not there. It appears to be a smooth skulled Pareiasaurus about 11 feet long. We had no suitable tools to get it out and no means of carrying it away. We left the cart far behind and the horses with us, with pick, spade, hammer and a little chisel. It is unfortunately in a crumbling blue shale and the bones are already broken into many pieces with effects of hundreds of years sunshine and frost. Still I determined to try to get it away. We chiselled and pecked and got the head out in many pieces. Everything will be similarly broken but at sunset we stopped and arranged to return with bags to put the bones of the several parts in and a waggon with packing cases, so that it will not be all lost. The ulna has the mammalian form. The radius is relatively stout as in a reptile, the femur is moderately long, and a finger bone shows, that the foot was short. We previously knew nothing of the limbs, and in many respects it adds to our knowledge. I am going to Fraserberg to reach Klip Fontein in search for mammals. It is wonderful to see these beasts in their native rock lying almost free on the surface. Such an animal ought to require 4 days to extract but I cannot afford the time.

Thy loving husband
H. G. Seeley.

Royal Hotel
Beaufort West
Sunday 18 Aug. 1889

My darling Wife,

I was glad to get your letter of the 25th July tonight. It had been locked up with one from Fotheringham because there was a penny to pay for redirection but Mr de Smit sent for the Postmaster and made him disgorge.

On Tuesday 13th August we started again at 6 o'clock in the morning to cross the Neuwfelt Mountains, Mr. J. S. Marais driving us as far as Bex Platz. Marais is a well-to-do farmer, a boer ; and neither he nor his family speak a word of English. Mrs Marais does the household work, and this seems the rule with the boers. Their houses are of one story, and built as a rule to enclose an angle which gets the morning sun and the afternoon shade. The front is always raised and often has a verandah with vines or passion flowers. Mr Marais' house opens by a front door, which leads at once to sitting room in which hang the guns, the marriage register with names of all children born, a few texts in Dutch in large print, and a looking glass. The chairs are heavy and stuffed with horse hair. On the right is Mr Marais bed-room; I occupied the room on the left. Opposite the front door is another door communicating with the spiese-saal in which the family take their meals; to the right of it is the kitchen and the larder is beyond Marais bed-room. There is always spring bock or steen-bock or beef hanging in the sun to dry, when it is called biltong; and is cut in thin slices and eaten raw when travelling; and I must say it is good. On the other side of the house are the bedrooms, with doors opening outward; and beyond the bed-rooms the general dealer's shop and at the end of all the post office. Behind this are the stables. I have taken kindly to the boer and find him everywhere exceedingly kind and hospitable and anxious to be of service. We reached Bex-Platz [Beckseplass] about 8 o'clock and had breakfast. The farm there is a partnership between a young Dutch boer and a middle aged Russian Jew, known as Mr Benjamin, whose real name is Novics. They told me that he fled from Memel in disguise and wandered in Russia for 6 years under an assumed name till he got a passport, and came to England. He is now naturalized, has married a Dutch wife and eats pork like a Christian. We breakfasted on grilled slices of mutton and coffee; which is almost always excellent, and is the drink of the country which every boer offers you. Mr Benjamin loaded up, and we started again for Frazerberg; which we reached soon after 7 o'clock at night. We were soon in the mountains and I was never more amazed to find the rocks perfectly horizontal, undisturbed by any upheaval. [*Insert from margin of page* " Fotheringham says there is not a single honest reef in the Transvaal "] The pass is called Oude Kloof. As we climbed up it was always to see a succession of flat topped hills just like the scenery of the American Cañon country, and quite as volcanic. Dykes of basalt form a network through the country and penetrate horizontally without appreciable tilting of the sandstones and shales. We drove past Steenkamp's-Poort (pronounced Stinkum's) but stopped at Paul Melan's. He too is of Hugonaut family, but now only speaks Dutch. Yet in his mouth the language is soft and beautiful, every movement of his body is graceful. As he speaks his hands move expressively and quietly, and his face lights with smiles, what is otherwise as earnest, honest frank and rather commanding face. His wife though a Dutch woman seems to have caught his sweetness of manner but they have no children to succeed to the most tasteful inheritance which I have seen. He had a hand of a saurian and said that his brother had found it on a large slab, and finding the slab too heavy had thrown it away on the mountain breaking off the hand. On our return the brother should take us to it. I believe it is the missing mammal I am seeking but it is fractured through the carpus just at the point where the interest is most intense. We pressed on to Balmoral which somewhat reminds you of its Scotch name-sake and was formerly the farm of Mr Finlay, Mr Lütte gave us coffee; and we inspanned and soon found ourselves on a plain more than 4000 feet above the sea without any appreciable descent from the mountains. The sky grew dark and everything betokened a deluge which would have brought wealth and joy to hundreds of homes. Sheet lightning and thunder were imposing and there was a little rain but it ceased by the time we reached the Frazerberg Hotel. Here the commissioner Mr Mynheera and Dr. Manson came to receive me on arrival. I went in the evening to see Mr Erth son of the President of the Cape Town Young Mens Christian Association, who fetched me a fossil from the house of the Rev. P. D. Russouw which indicates a new saurian genus. His Reverence is away so I could only ask to have it sent to me.

Next morning Jehu was again in his seat at a quarter to seven and we were off for Klip-fontein in the Mountains 3½ hours drive to the SE. We drew near to the back of the Tafelberg and reached Klipfontein about 12 o'clock. The district is occupied by the Erasmus family who were eager to help us and showed us where Mr Finlay obtained his specimens. There was a hand somewhere well known to all the boers, which might have belonged to a specimen, Theriodesmus which I figured but no one could take us to it. We found a few reptile bones, and a few fish fragments, but they were not worth the ride we had for them. We had to go the round of the Erasmus's and drink coffee with each of them after dining on our arrival with the head of the family. The rocks here are what are called the top of the Stormberg series where the shales are baked by covering lavas (now denuded) and where volcanic ash included many vegetable remains, too imperfect for identification. In coming back we examined the spot where Mr Russouw's fossil was found in purple shale, and reached the Frazerberg Hotel about 7 at night. Next morning we visited Mrs Finlay and obtained a few of her husband's fossils,—he being now in the Transvaal, and Mr Benjamin was sent off to buy gunny bags, so we did not start till after 8 o'clock. We intended to breakfast at Balmoral, but Mr Lütte had sprained his loins, so was in bed. The house was full of the Finlay family on their way home ; so we got no breakfast. On the road our bread and butter came out with the Biltong and we drove down to John van Renau's at Steenkampspoort. At Klipfontein I was brought a lump of sulphur from a neighbouring farm, perfectly pure which was said to extend over the surface of the country in a vein rising above the surface, a part of it was yellow and part brown, as though it had been heated. At Balmoral there is a reputed diamond mine, from which no diamond has been obtained but because the rock is exactly like the Kimberley rock people are putting their money into it. They say there is a crater. I did not visit the spot, but I shall be amazed if any diamonds are found, first because of the decomposition of the rock has not liberated one on the surface, and secondly because there is no coal below out of which diamonds could be formed.

Van Renau was in the Navy speaks English, and thought that Sir Charles Lyell must now be very old. He brought Russian prisoners home from the Crimea. A hale old boy who regretted that he did not know much about fossils, having been a sailor. I said we could hardly expect to find fossils in the open sea, and he lamented that it was so. In his loft there were a few bones, of no value through bad collecting, but I picked out some scutes very like those of a crocodile. Mr Bain now began to knock up with the severity of the journey. We had coffee with Mrs Melan at Oude Kloof, and she gave me the coveted ' hand '. We went to her brother, who lives in a tent, but he was away having waited for us as long as he could. So the coveted animal to which the hand belongs had to be left, to my infinite regret, on the mountains somewhere between Oude Kloof and Beaufort. Mr Bain got bad, just like a new hat that you accidentally sit upon ; it seems to be a habit with the colonists to collapse like a child's house of cards. So I did not stop to make drawings of scenery, which was magnificent and much more impressive on the return journey. We reached Bex-platz where Mr Bain got to bed at once, and I dined with my Jew and Dutchmen. Mr Baron another Russian Jew, a feather buyer told me that you can now buy an ostrich for from ten to 15 shillings and that you can pluck it twice in 18 months, the feathers being worth 15 shillings at each plucking. The sheep are every where in good condition, although there has been no rain for 9 months. A farmer remarked that if rain fell twice a year everyone would be prosperous, but sometimes years pass without rain. Mistletoe grows luxuriantly on the mimosas and is found to be an excellent food for cattle, but the Boer with characteristic want of thrift cuts down the tree to get at the mistletoe so that the supply ceases. I had some cape brandy went to bed at 8-30 and slept like a top. Mr Bain was much better and we started for Tamboer about 6-30 where we once more had a good meal in the house of John Marais. Mr Bain got well as he knocked up. I got him to write a letter in Dutch to Paul Melan and he sent five shillings with it, to pay a Hottentot for carrying the specimen, if it can be found, so I hope it may eventually reach Cape Town. Marais had found a new skull, a very striking animal but either it had been carried away by a herd or washed away from the skeleton for it was freshly broken and very imperfect but still a new animal, though I know not what. We visited the spot and traced some fragments of the bones for a quarter of a mile but too imperfect for identification. After dinner we started for Bad. The bath is so in name only for no one here ever seems to wash, and except in towns water is too costly to be put to such base uses. The waggon had started long before with a great box on it in which the beast was to be packed. It was drawn by a team of Donkeys. We started in two carts and Sarel Marais of Blaauw Kop the discoverer of the saurian was on the spot on our arrival with a man so that we were 8 men and a boy. Rapid progress was made in quarrying out the animal which was in a bad state of preservation being in friable shale. So I am afraid much of its limbs have been left behind and I know its ribs have been partly destroyed. Still soon after sunset it was in its box, or coffin as the boers said, and we were all mounting the carts, except Marais' three grown up sons, who were left to drink coffee

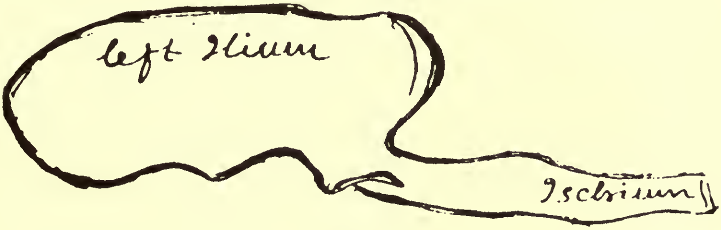

FIG. 3

and bring back the bones. We had coffee with Sarel (=Charles) Marais. He lives in a very poor hut and the seats of his chairs, like those of the Erasmus family, were made of crossed throngs of raw hide. The room was dark, with no ornaments, and the furniture poorer than in the house of an English labourer; yet he was building a dam, and digging for water, and manfully trying to feed his babies by cultivating his farm. If the specimen had been in better condition I should have taken a week to extract it. But I have already seen some of its characters which are of interest. Thus the pelvis is well shown and in side view it shows the contour so that the ilium is in advance of the acetabulum and the ischium and pubis must be arranged on the Mammalian plan (Text-fig. 3). I was astonished when the hind limb was unearthed. The proximal end of the tibia, in contact with the femur showed an altogether mammalian character. The bones, much stouter than the fibula as in mammals and the astragalus was united to the os calcis as in some mammals (Text-fig. 4). I was impressed by the absence of a pulley joint at the astragalus and by the large size of the calcaneum and saw that if the base of the fibula grew smaller it would result in a projection of the tarsal bone which would eventually take the mammalian form, . . . It was very interesting too to get one digit in situ and so prove that Pareiasaurus has claws and three phalanges in the digit as in mammals. I was not less delighted to get some further light on the shoulder girdle. The scapula is a very large expanded bone with a slight spinous ridge, and a strong acromion (Text-fig. 5). The clavicle oddly enough is shaped like a bone in Iguanodon which Hulke has referred to the shoulder girdle. Of the coracoid I at present know nothing. I should have liked to remain seeking more Pareiasaurians but I cannot travel alone and do this work since no one speaks anything but Dutch. The thing would be to come with a waggon, with electric light, and all modern appliances; and work without hurry, when the bones were found. This animal was a little disturbed after death, for some beast crawling over him had knocked out some of his tail vertebrae.

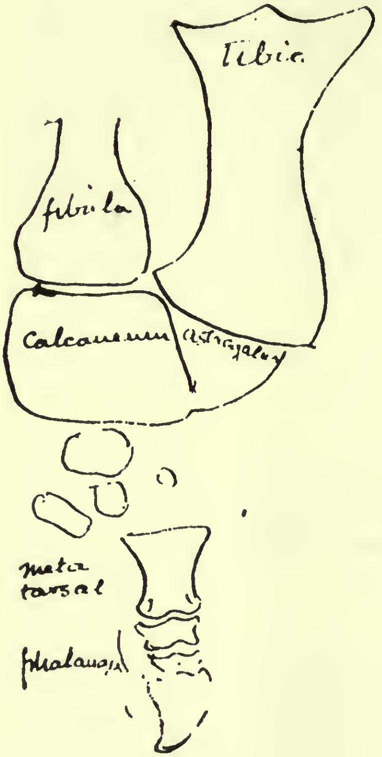

Fig. 4

I gave Sarel Marais a sovereign, and John Marais a sovereign and another pound was divided between John's sons. If I get nothing else I shall feel that I have something to show for my journey. . . . It was very difficult to restrain the men's picks from destroying what was most important to preserve, as one was working at each end and others were belabouring the brute with hammer and chisel, and I was constantly at work marking fragments with vermillion paint to ensure their coming together again if they survive the journey. Marais's little boy amused us by proposing to look for the dragon's spoor, and Mrs Marais remarked in the evening, when I drew the form of the animal in the flesh, that he would have made capital biltong. She said she was glad the animals were all underground for she should never have been able to live at Tamboer with such beasts eating up the cattle. The whole country is, I hope now aroused to an interest in bones.

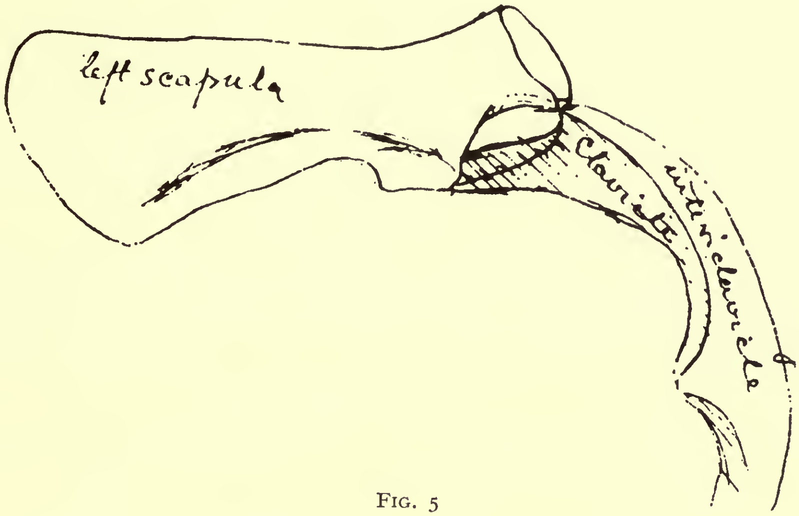

FIG. 5

I have settled the horizons of the animals. Pareiasaurus and Tapinocephalus, and perhaps Titanosuchus come from the lower beds of the Upper Karroo. I think the Dicynodons are all newer. While newest of all are the long limbed Dicynodonts and mammal-like forms, which may be referred to the upper part of what are called the Stormberg, the Upper Karroo and Lower Karroo, and mass them in one formation. Saturday morning we spent in packing the spoils of other journeys. Two boxes were nailed down, while the largest and smallest were left for John Marais to fasten, and the whole will travel on his waggon to Frazerberg Road, and by train to Cape Town. After breakfast we started at 9 o'clock for the station, driven by Marais. We lunched there and examined some fragments of bones which we had put together before going up country, but now kicked them over as useless. At last the train came $\frac{3}{4}$ hour late, and we arrived in Beaufort West, soon after 6 o'clock. Mr De Smit had come to meet us. I stayed at the Royal Hotel, and Bain at another place, and I am taking my Sunday morning rest in writing this while Bain is with his friends. This afternoon we start once more. But we are giving up Murraysberg and Graaf-Reinet as making the labour too severe, and running the time too fine, and instead shall make our way to Cradock by rail, which will take one day. I wrote for your this weeks letter to be sent here, but it has not come. I trust you are well and happy. I have sent to you by every post since I landed. In the velt where everything looks parched and grey and every bush dead the sheep grow fat, so I hope it may be with our life if we come here. There is food if you take what God gives, is the lesson I learn from my life in the Desert, and that it is only a desert to those who demand that it shall grow European grass or plants which require a European Climate. You dry up, your nails break, paper breaks as you fold it, but still man and beast are healthy. Rheumatic fever is the severest ailment but the willow everywhere provides a cure, which is due to exposure to cold winds after the heat of the day.

My love to my daughters Maud, Brynhilda, Phyllis, and Sylvia. I have had no time till now to write to them severally; but I remember that this month I am to sail in the Trojan; and exactly a month from receiving this I shall hope to be with you again. I have yet far to go, to Kimberley, Aliwal North and Grahams Town; but the journey is passing well, and every day will bring me nearer to you, when I shall tell you over again the story that I now outline, with my children eager about the brown men of this marvellous country.

Thank Phyllis and Maud for their letters which I am glad to have. This afternoon we have been to Welte-freede and got the ribs of another new beast. The ribs are like wide laths and form an impenetrable armour as in some edentate. We found the country covered with fragments of bone, and brought some away but nothing good.

Thy loving husband,
H. G. Seeley.

VENTERSSTAD, 29 August 1889
Burghers Staat, 31 August
Aliwal North. 1 September

My darling Wife,

In Kimberley the houses are largely made of corrugated iron and the streets are irregular, just as the tents were placed. Substantial houses are appearing made of brick and stone. House-rent is enormous. Mr Wright tells me that a four-roomed house fetches £250 a year; and that the yearly rent of any house is one third the cost of building. Kimberley is in a great plain about 4,400 feet above the sea, almost perfectly level to the Vaal though the great bridge into Barkly West is 300 feet lower. The only hills are those made by man in the last few years by the Diamond mines bringing to the surface the 'Diamond-blue' rock, and pouring the washed material upon the surface. The hurry of life is great at Kimberley, and money is made readily and spent freely, the shops are good. The streets are named after the early makers of the place, Stockdale, Ebden, and of course there is a squalid 'Piccadilly' with the adjacent Regent Street and Oxford Street. On our return from Barkly along one of the dustiest roads I ever travelled, we devoted the next day to seeing the De Beers mine. Mr. Feltham had horses ready and drove us out to it. There is a smaller yawning hole like that of the Kimberley mine which is about 600 feet deep and in the centre of the Town. The mine has large fields like a great farm on which the rock is placed as it is brought from the mine. Gangs of Kaffirs went over it with hammers and broke up the masses so that the eye could see that they were smaller even in the distance. In nine months the atmosphere breaks it up so that the rock can be washed. By night these vast fields which bear no crop but diamonds are lighted with electricity which is also used in the Town. The rock is a breccia full of fragments of lava, gneiss, schist, syenite, shales, and in some of the shales I found vegetable fossils, which appear to be the same as those in the shales which extend horizontally near the surface of the country. Many of the pebbles are waterworn, and even perfectly rounded. This is the material which fills the throat or pipe of what is regarded as a volcano, and I must say a more extraordinary volcanic rock was never seen. The throat is oval, it descends more or less vertically through grey shale with Mesosaurus black shale, amygdaloidal lava and quartzite. In the Kimberley mine which is now only worked underground, the working is now descending obliquely. The machinery for washing is very elaborate, and the circular pans which contain the substance which is not removed as mud are only emptied once a day. Yet men are ceaselessly occupied day and night in emptying iron waggons of Blue into the pans, and other scoops as rapidly carry up the mud and empty it on the ever growing hills. The stones which remain are picked over by convicts who put the diamonds as found into tin pots, and sweep the residue off the table into huge cans. This waste gravel is examined four times before it is finally used for road paving. I was there as the convicts left for dinner. They stript and each in succession handed every article of clothing to officers to examine for concealed stones. The company is beginning a nursery for planting their waste land with forests and have already an immense number of young trees raised from seed. They have built and nearly finished a village for their married white employees, and near it a smaller village for the unmarried. We then saw the diamonds obtained in the last two days which were all sorted. One stone rather took my fancy it was small but would have cut into a fine oval; its value in the parcel was only £3.10.0., but as a separate stone £5. I find that the price of diamonds fluctuates from 17/6 to 25/0 a carat and is now about 30/–. We then were driven to the Kimberley Club for lunch. (Kimberley wanted to entertain me at a public dinner but I could not spare time to stay for it). The club is splendidly built and fitted and as good in its way as anything in London with electric light throughout. We formed a little party with Judge Cole, and I also met there Judge Lawrence a former contributor to the Westminster Review. In the Afternoon the cart with fresh horses drove Mr Bain and myself back to the mine to go underground. We were taken down by Mr Gardener-Williams the manager in an inclined almost vertical trolly. On the 300 feet level we walked across the entire width of the throat and saw the amygdaloidal rock which surrounds the diamond blue. At the junction there is sometimes a slicken-side surface, and sometimes a seam of clay, and sometimes close contact. At the 600 feet level to which we descended in a steep incline in a trolly nearly on end, the temperature was very high and the blue rock was much more compact. After examining these workings, we went down to 700 feet, where the Kaffirs were wheeling up waggons 4 abreast on tramways and emptying them with wonderful speed into the skips which each take 8 loads to the surface. We did not go lower. At an electric signal we were hauled to the surface, wet through with perspiration, with a temperature like a hot Turkish bath. After a short rest and a little drink we were driven to the Kaffir compound which is within the mine. It is an enclosure in which 1500 Kaffirs live and from which they never go out except to the mine during their period of service which is not less than two or three months. The night shift of 700 were there in their many coloured blankets, divided according to their nations, all looking very picturesque. Some were buying food or luxuries at the store, others cooking, others sitting in the sun or walking about. It looked almost like a bazaar to see their clothes or bundles hanging in front of these continuous one roomed dwellings. The hospital is large and roomy, one side for fever patients the other side for accidents. They are provided with doctor and medicine free, but have to maintain themselves while sick. They earn three to four shillings a day and cannot spend a penny on drink while in the compound. They undergo a five days detention in a special room before leaving to make sure that they will not carry any stones out with them. We drove to the Queen's Hotel for our coats and then to Du Toits pan at Beaconsfield which I had been invited to examine. It is a vast open pit like a figure 8 somewhat in form. We saw the streams of Kaffirs leaving work toiling up the sides of the mine while the bell rang. When it stopped boys lighted the fuses for blasting and we saw and heard the wonderful cannonade which prepares for the next day's work. And so back to the Hotel to dine, pack specimens and get off by the 8-35 night train for De Aar and Colesberg. At Dė Aar Bain began to get unwell again. We reached Colesberg at about 1 pm and stayed at the Vrÿstaat Hotel. After lunch we called on the Civil Commissioner, Mr Robinson, and Mr Bain went to bed while he drove me to a quarry to find Fossil fish, I got some fragments, a broken reptile bone, and bits of reeds, but found Dr. Holub had carried away everything worth having; so the Civil Commissioner proposes to put some convicts to open a quarry for me to obtain some. Is it not wonderful to think of being so much indebted to convicts. Next morning we went to a Mr Plumen's farm at Mr Bain's wish, and saw nothing but fossil trees, probably coniferous, mineralized with silica. I heard of a Mr Slutter's farm 5 hours drive away of 20 or 30 large trees with their roots lying prostrate parallel to each other as though overturned by a rush of water, perhaps an earthquake wave or the wave of a cyclone. Coming back after dining at the farm on bread and butter and tea, we searched Colesberg Kop a conical flat topped mountain of 1100 feet. Like so many of these mountains it rises out of a level plain, and is capped with volcanic rock. There was not a trace of a bone to be found. After our return we inspected the work of the prisoners at the quarry but no bone was to be seen, and no fish. So this morning the cart was ordered at 6 o'clock, but the landlord did not get up till nearly seven, so we were kept waiting. At 9.30 we outspanned on a tributary of the Orange River and cooked breakfast. It was beef-sausage about 2 inches in diameter which was fried in the open cooked with the fuel of the country gathered from the road where dropped by the Transport oxen. I did not care much for the sausage. At one o'clock we outspanned and had bread and beef-biltong with coffee for luncheon, and afterwards examined some rocks for fossils and found them not rare beyond Bultfontein where the green shales capped with dolerite form a succession of hills like an escarpment. The fossils were not in good preservation and we saw nothing but skulls. This is very remarkable, and does look as though some of the animals lost their heads. Bain is irrigation officer and is zealously looking out for sites for making reservoirs so that when he has finished with it the colony will be known as the country of the dammed. We pass the night at Ventersdorp, and tomorrow go to Burghersdorp on our way to Aliwal North. Bain tells me that in Namaqualand where the ant hills are larger than they are here the farmers give up work when the pupae are ripe and dig out the " rice " from which they obtain an oil by heat, and then dry the pupae for food. A bucketful is obtained from a single ant hill.

I hope you are all well. I send my love and kisses to my daughters, Maud, Brynhilda, Phyllis and Sylvia. I come home in the Trojan due 8th October at Southampton. I have not wanted any winter clothing and so far have been as well as could be on these high plains.

Thy loving husband
H. G. Seeley

Sunday. We reached Aliwal Saturday night and found Dr Atherstone at the Criterion Hotel. We walked into the Free State before breakfast over the Orange River and have spent today chiefly with Alfred Brown who is a poor man, the Librarian. He has lent me some of his best specimens which are either small mammals or mammal like reptiles in rocks with coal plants. Tomorrow we hunt fossils.

QUEENSTOWN, SOUTH AFRICA,
4 September 1889.

My darling Wife,

We came over very high country after leaving Venterstad rising in a succession of terraces till we were 5600 feet above the sea, when the view extended probably for a hundred miles into the Free State. In the fore ground low hills sometimes conical or pyramidal or flat topped rose from the level plain, and behind them mass after mass rising sometimes in ranges sometimes in isolated clumps all of a warm red colour, growing higher in the distance where their outlines rose grey far beyond Bloemfontein. I saw the most terrible destruction of the country going on everywhere, for the rains are plowing up the country and forming gorges and deep running rivers which drain the water from the land, in districts where formerly no rivers existed and where the hills were clothed with forest. But as firewood is worth in places like Kimberley £14 a load the hills have been bared, so that much of the finest land in the world will soon become desert. We dropped down among the mountains of Burghersdorp, about 700 feet lower, and at a sudden turn in the road found ourselves in a not inconsiderable Town, with the usual broad straight streets planted with trees and put up at the Prince Albert. They wanted us to occupy one room, reluctantly gave us two, then said we must put up with one. They acknowledged that they had plenty of room but were keeping the rooms in case they should be wanted, so I ordered the horses in again and determined to go on by train to Aliwal. It turned out afterwards that the landlord was keeping the rooms for ourselves. However his accommodation was bad and he was impudent, and we had heard from Dr Kannemeyer that Atherstone had already gone to Aliwal. So we went on in a goods train, in the guards van with the mail. Dr. Kannemeyer is an enthusiastic collector, whose duties as a surgeon carry him into fossiliferous localities. Atherstone left word that we were to put up at the Criterion. We found that he had already been to see Alfred Brown and arranged to see his fossils at 10 o'clock on Sunday morning. So we went. Brown is a short, withered looking miserable man of about 55 of the grizzled unkempt type. He showed me the Maxillary bone of Euskelesaurus of which we saw some tail vertebrae and pelvic bone in Gaudry's museum. It is shaped like the maxillary of Megalosaurus and has two teeth preserved. He has a few toe bones and claws similar to those figured by Paul Fischer. All of which he has lent to me with permission to sell to the British Museum for him, if he approves of the terms. But I was more interested in getting from him a large number of teeth and fragments of jaws, some of which I feel sure are mammals and some of which are mammal like, but unfortunately they are too fragmentary to show what they really are though indicating new genera. It was a great wrench to him to part with them for he loves his fossils as though they were children. After seeing them he showed us his living pets, a small zoological garden with the finest assemblage of Lizards, and some Tortoises, and birds. He had £50 a year as Librarian, and a pension of £30 a year, and told me he would gladly give up his position as Librarian if he could get £30 a year for collecting fossils. He has an interesting series of fossil plants Stigmaria, Lepidodendron, Glossopteris, Pecopteris and other ferns, such as Neuropteris Sphenopteris and others new to me. So that I formed the opinion that the rocks are similar to the Indian and Australian lower mesozoic series which also contain coal ; and I formed the opinion that these rocks are high in the series called Stormberg. Dr Atherstone contested my view, but some days later had to give in, I went to the Treasurer of the Library and begged a days holiday for Mr Brown who drove with us to the Kraai river. It is a good river and as the water was rising our driver, an old French-Dutch farmer, feared to drive through, because he might not be able to drive back. So we went over in a boat at the Wool wash which stands high above the river and yet is occasionally carried away by floods. A Kaffir carried our dinner and pots and pans on his head for two miles which we walked to the mountain. We searched and found many fragments of bone, but nothing of interest till Brown struck the lower jaw of Euskelesaurus. No one knew what it was. The articulation was of great interest and importance as showing the articular bone in the Saurischia. As Brown worked away he grew excited as a terrier at a rat hole. Unfortunately the anterior part of the jaw came to the surface and was lost for it was in a deserted waggon road, but there were fragments of teeth, sufficient to determine the genus. In the afternoon we drove back, to visit the locality where Brown got the mammal-like teeth.

It was a most unlikely spot, greatly denuded ; but Bain found a small and useful fragment of a skull. I was delighted with Aliwal and sorry to leave it. Next day we came south to Cyphergat [Syfergat] which is past Molteno to see the coal mines. Some coal ferns were brought to us at the Molteno station. And at Cyphergat we had to take scanty accommodation, two beds in a room at the highest rates. There are about 20 whites and 300 Kaffirs. Some of the whites were Ilkeston men from Derbyshire who had attended my Gilchrist lecture there. The coal seam is about 3 feet thick, with two thick partings of clay. The coal burns as well as much that we get. It is sold at the pits mouth at 14 shillings a ton. The Kaffirs earn about 18/– a week and live on 2/– a week, many never touch stimulants and save their money to buy cattle, others spend everything at the Cyphergat Hotel. The white men earn £6 a week and can live on 15/–. We went into the workings till it became necessary to crawl on the abdomen carrying your little lamp. We got samples of the plants, chiefly ferns, but after being in house all night the vegetable substance flaked off. Above the coal in the sandstone I found tree stumps standing erect one above another without underclay. The upper tree is carbonized, 80 cm high, and 25 cm wide at the base. The one below is in sandstone and is remarkable for having the roots jointed and ribbed like a Calamite, only in section the calamite form is an *internal* cast while the external carbonaceous tissue has the nodes elevated instead of being constricted. Some of the tree stumps are very wide in the extension of their roots. So that there can I think be no doubt that the trees grew on the spot and that the coal grew where found and is not drift coal. We also drove to the mine at Fairview where there are only two white men. Coming south to Queenstown we saw the far off hills towards Tarkastadt and much striking scenery. We left behind the raw winds of Cyphergat and we descended to level, came upon a land of rich farms in fine scenery near Bailey and further south on the west of the line. Enormous mountains are often red at the base with masses of blossoming Aloe. Owing I suppose to my movement I have not had any letter from you for a fortnight, and till I get to Grahamstown I shall have no news of you. I hope you are all well and happy. It is only a fortnight before I sail.

Thy loving husband
H. G. Seeley.

GRAHAMS TOWN
SOUTH AFRICA,
9 Sept 1889.

My darling Wife,

My travelling is now practically over, and I am looking forward to the journey home. From Queens Town I went to Lady Frere which is a days journey and there we got a vertebral column entire which will be most valuable. All those things have been sent to East London to go by sea to Capetown. Dr Berry who went with us gave me two good portions of skulls which anyone would say were mammalian but are probably reptilian. We parted at Queenstown, Mr Bain going to King

William's Town and I coming on with Dr Atherstone by cart. We crossed the Katberg in two days and had a grand view of the country and on Sunday reached Fort Beaufort, and am now here so that I am glad to have a days rest after 5 days life in a cart which always begins at 6 o'clock in the morning.

I have already taken a brief survey of the museum, which has at least *one* interesting specimen. On the whole the results of my journey are thoroughly satisfactory. If not quite all that I wish, at least altogether superior to anything ever obtained by a visitor to the colony. Tomorrow I am to lecture on ' Scientific Discoveries in South Africa ', in the Public Library. Mr Bain joins me tomorrow, and on Wednesday we return to Cape Town. I believe I have two lectures to give in Cape Town, and I have to arrange about getting all my things to England. I have also my report to write for the Government on the Gold Fields, and various public men to see, with a view to future movements in future years.

And now a word to my dear children. I am longing very much to see you all and be with you again for I have had no letters for the last three weeks, though I have telegraphed for news to the Capetown Post Office.

I have seen so many children who grow up without ever wearing clothes that I shall be glad to get home to civilization. The thing I have missed most in the way of comforts is a bath, since the water is so scarce that you learn to wash in a teacup. I have seen wonderful plants and trees ; but fewer wild animals. I have met with the greatest kindness from everyone. I had had the life nearly jolted out of me in being jolted by the carts over thousands of miles of country covered with big stones. I have seen an astonishing number of ugly people, and very few who are good looking, though many are well grown. I have seen more mountains than I could easily count and thousands more than I can remember. And now my darling on the 18th September I sail in the Trojan and pray for a safe and speedy voyage to bring me once more to thee and to our children ; and to our Vine, when I can tell over again the story of this wonderful land of plenty in the desert. I have no doubt the Union Company would send you news of our coming to port.

Thy loving husband,
H. G. Seeley.

Please tell Miss Schmidt I shall lecture at Kensington Square on the Geological Succession and History of the British Strata.

That the effects of Seeley's visit were not transitory can be gathered from the following letter sent to him by Daniel Russouw Kannemeyer, a keen collector and railway medical practitioner in Burgersdorp. The Dicynodont *Kannemeyeria*, of which several specimens are in the Museum, was named in his honour by Seeley in 1908.

Burghersdorf,
3rd May 1891

My Dear Sir,

I am much gratified that the specimens I have been instrumental in introducing to you have proved of such interest. I have always maintained that we had here the connecting links between Reptiles and Mammals. On a recent visit to Grahamstown Museum I found the various pieces of the best head I had contributed knocking about amongst heaps of stones, in several parts of the Curators room. One or two pieces I failed to recover. Originally it had complete upper and lower jaws, and the whole of one side of the skull. Perfectly undisturbed and imbedded in friable shale which a pen knife could clear, it formed a perfect example for minute examination. It was a different species from any of the others I sent. No other bone occurred with it. Recently I have again made a find which is new to me and may prove of interest. Five or six portions of maxillae and mandible, which I diagnose as Batrachian. The outer surface freely sculptured and pitted on the Lab. type; a series of small oval teeth closely set along the whole alveolar border; at a lower level and rising from the inside of the rami, are bold well defined canines, which under even a low pocket lens show Labyrinthic dental structure. In the upper jaw in a line with the canine a second series of more or less uniform sized teeth occurs extending backwards. I found no other bones of the animal. I have deeply burnt your remarks about the desirability of obtaining the bones of these animals into my memory, and have little doubt that I shall soon be in a position to supply the want. It is, however, a remarkable fact that one often gets a number of heads and no other bones. Brown, Aliwal, has a theory that the bodies were floating; as they decomposed the heads dropped off and the inflated carcass drifted elsewhere and gradually broke up. After I heard of your intended visit to Burghersdorf I cleared up some patches of bones in a bank of red shale, sloping precipitously into the river, about a mile from the village. I left things in situ for you. Recently Revd D. Fraser, Port Elizabeth, Inspector of Schools, present president of our Geol. Society, passed through our village. I took him to the spot. The heavy rains had washed away one patch, but in the other we found the greater portion of a dicynodon head, which he has added to his collection. On previous occasions I had found these three heads, all D. (*Dicynodon*) and one serrated tooth, but no trunk bones. The head differs from those I found at Bethesda.

I would have sent you the jaws previously mentioned, ere this, but I intend first to show them at our annual meeting of the Geol. Society, next July in Kimberley. We are all in the dark here as to what is really wanted at "Home", and it has just struck me that a letter addressed to us, indicating lines of research will be of the utmost value, will give us a much desired and needed stimulus, and be productive of results. Or you might give a very short summary of the results of your visit to S.A. which I could read as a letter. I fear we will have very few papers. The Society is in very bad hands just now, Atherstone's brain is softening, and he is no good as President ; Wilmott has his hands full with politics, knows nothing of Geology and took the Secretaryship at a time when he wanted his name before the public in as many ways as possible, with an eye to his future election to Parliament. We all regret that the negotiations fell through which would have secured you for S.A. for some years. It would have given the study a fillip much needed. Our best man, Dr Shaw is dead. His idea was to start a Geol. Society and hold the annual meeting concurrently with the Teachers Annual Congress, in the expectation that some of the teachers might be around to take an interest in the subject and teach it as a living science. I have succeeded in interesting several of our farmers in geology, but stern puritans that they are, with one exception, they gave it up, when they saw that its conclusions tended to undermine their primitive creed as to creation and age of the world, etc. and that the wonderful fossils are not the remains of Elephants, Elands and other game.

Next Sunday I shall remove a jaw from a rock about 1½ mile from here. It is also one of the things I left in situ for you. It is a mandible, shallow and almost circular, but perfectly smooth on its outer surface.

During my next visit to Capetown I shall submit the Museum cellars to a thorough search. I must recover (a) the " Wonderboom " fossil, the four-canined one, (b) the minute animals I found embedded with it, (c) several heads I sent. Under the present curator in Grahamstown, there is a guarantee that specimens will be looked after. Dr. Schonland is no palaeontologist, but he does not neglect the material in which he is not interested. When the proposed removal of the S.A. Museum becomes an established fact, either to the castle or to a special building, we may hope to see some of the treasures now in the vaults exposed to view.

If you took with you a jaw partially cleared, with the condylar part of the ascending ramus wanting, I may mention that I have the fragment here in a block 14 in. × 14 × 10, which shows bone on all its surfaces. I have also part of the scapula (presumably : it was found with the jaw but weathered out.)

Yours faithfully,
D. R. Kannemeyer.

The correspondence continued for some years and the following extract from a letter in April 1895, shows that Seeley's memory lingered on in South Africa.

BURGHERSDORF,
22nd April 1895

Extract

. . . Your reported death caused much wailing amongst S. African geologists, but I kept up hope, still I was so much influenced that I tore up a long letter I was in the act of writing to you when the local editor walked into my study with Reuters wire in his hands stating " Prof Seeley is dead ".

Yours sincerely,
D. R. Kannemeyer.

A Professor Seeley was in fact dead, but it was the Professor of History in Cambridge, Sir John Seeley, who died on 13th January, 1895. As has been said Sir John was first cousin to H. G. Seeley.

It now seems remarkable that in this visit of a few months he should have been enabled to do so much.

He recognized the geological horizons from which the specimens that Owen had described had come. He explored the Lower Karroo rocks and discovered the *Pareiasaurus* skull and skeleton now exhibited in the Fossil Reptile Gallery of the British Museum (Natural History). He examined the Middle Karroo beds and found many interesting forms but not the whole *Dicynodon* skeleton for which he was looking. At Lady Frere, near Queenstown, the type of *Cynognathus* (R.2571) and other fine specimens were discovered and skulls of *Gomphognathus* were collected.

Not the least of his achievements were the friendships he created with important collectors and residents whose names are now preserved in palaeontological literature, such as Thomas Bain, Irrigation Officer ; Dr. Kannemeyer, with whom Seeley engaged in a lively correspondence over the years and which is now preserved in the library of the Palaeontological Department of the British Museum ; and Mr. Alfred Brown of Aliwal North who gave him specimens for the Museum.

In any case the described specimens came to the Museum where the Seeley Collection has long been appreciated and where much of it is on public exhibition.

The scientific fruits of this expedition were sufficient to keep the collector busy for years to come. As has been said they formed the major part of a series of papers in the *Philosophical Transactions of the Royal Society of London.* The series is entitled Researches on the Structure, Organization and Classification of the *Fossil Reptilia* and dated 1887. They are sometimes also referred to in this form in bibliographies and catalogues.

It may therefore be of service to enumerate the papers and point out their sequence :

Part I. (1887) *Phil. Trans.*, (B) **178** : 187–213, pls. 14–16.

" On *Protorosaurus speneri* (von Meyer) ".

Although this is not a South African reptile it was one which the Grant from the Royal Society had enabled him to see during his European visits preparatory to the Cape Colony expedition. In the paper he gave a full description and an excellent figure of the specimen in the Royal College of Surgeons collection, and as this was one of the victims of London bombing in the second World War the paper is still of great value.

Part II. (1888) *Phil. Trans.*, (B) **179** : 59–105, pls. 12–21.

" On *Pareiasaurus bombidens* (Owen), and the Significance of its affinities to Amphibians, Reptiles, and Mammals."

This was essentially a description of the skull and skeleton from Palmiet Fontein sent to the British Museum by Thomas Bain in May, 1878 and prepared under the direction of William Davies (Regd. no. 49426). Owen had originally regarded *Pareiasaurus* as a dinosaur and Seeley was able to correct this view.

Part III. (1888) *Phil. Trans.*, (B) **179** : 141–155, pl. 26.

" On parts of the skeleton of a mammal from Triassic rocks of Klipfontein, Fraserberg, South Africa (*Theriodesmus philarchus*, Seeley), illustrating the reptilian inheritance in the mammalian hand ".

This splendid specimen of a reptilian forelimb and hand was collected by Mr. Thomas Bain and presented to the British Museum in 1878. It is registered 49392. Seeley sought to establish that it was mammalian but the concensus of modern opinion, like that of Bain himself, is that it is a Therocephalian, despite the formula (2,3,3,3,3) for its phalanges.

Part IV was, for some unknown reason, never published.

Part V. (1888) *Phil. Trans.*, (B) **179** : 487–501, pls. 75, 76.

" On associated bones of a small anomodont reptile, *Keirognathus cordylus* (Seeley), showing the relative dimensions of the anterior parts of the skeleton, and structure of the fore-limb and shoulder-girdle ".

The little specimen was also collected by Thomas Bain and is registered 49413.

Part VI. (1889) *Phil. Trans.*, (B) **180** : 215–296, pls. 9–25.

This part was a much needed review of the anomodont reptiles and their allies, made possible by Seeley on account of his first hand knowledge. It is a paper which is still valuable to the student.

Part VII. (1892) *Phil. Trans.*, (B) **183** : 311–370, pls. 17–23.

" Further observations on *Pareiasaurus* ".

This was, as the title suggests, a review of the osteology of that important Cotylosaur but it was illumined by many studies that the author had made in the three years since his earlier communication on *Pareiasaurus* and it was prefaced by a statement on the Geological horizons of South Africa.

Part VIII. (1894) *Phil. Trans.*, (B) **185** : 663–717, pls. 60–63.

" Further evidences of the skeleton in *Deuterosaurus* and *Rhopalodon* from the Permian rocks of Russia".

These two Dinocephalians have strong resemblances to South African genera, so that in this series of papers Seeley was clearing his own mind in preparation for a grand review of South African fossil reptiles, a review that was encompassed in Part IX of the series, which was split into six sections and constitutes a great contribution to the basic knowledge and classification of the fauna.

It is quite remarkable that among the many official calls upon his time and his self-imposed regime of lecturing, he should have been able to produce this important work. These papers need perhaps only be listed here :

Section 1. *Phil. Trans.*, (B) **185** : 987–1018, pl. 88.

" On the *Therosuchia* ".

Section 2. (1894) *Phil. Trans.*, (B) **185** : 1019–1028, pl. 89.

" The reputed mammals from the Karroo formation of Cape Colony ".

Section 3. (1894) *Phil. Trans.*, (B) **185** : 1029–1041, pl. 89.
"On *Diademodon*".
Section 4. (1895) *Phil. Trans.*, (B) **186** : 1–57, pls. 1, 2.
"On the Gomphodontia".
Section 5. (1895) *Phil. Trans.*, (B) **186** : 59–148, 34 figs.
"On the skeleton in new Cynodontia from the Karroo rocks".
Section 6. (1895) *Phil. Trans.*, (B) **186** : 149–162, 4 figs.
"Associated remains of two small skeletons from Klipfontein, Fraserberg".

These were *Theromus* and *Herpetochirus* both now regarded, somewhat uncertainly, as Bauriamorph reptiles.

This important series of papers thus ended in 1895. Seeley's own specimens were received in the British Museum (Palaeontological Department) from 1892 onwards, being presented by the Council of the Royal Society.

Seeley's researches on reptiles, old and new, still continued and the pages of the *Geological Magazine*, the *Quarterly Journal of the Geological Society* and the *Annals and Magazine of Natural History* all bear testimony to his industry. Still the reptiles of South Africa claimed most of his attention but in 1901 he produced *Dragons of the Air*, an account of the flying reptiles, which, though now out of print, is still a standard work on the subject that has never been replaced.

The *Geological Magazine* in June 1907 published a brief account of his work to which is appended a bibliography of his writings to that date. Alas, there was not much more that he could accomplish. A year later he was stricken with illness and gave his last lectures. He died on January 8th, 1909, after much suffering in his home at 2, Holland Park Court, London, W.

Honours came naturally to him in some number. He served several times on the Council of the Geological Society. He was Vice-President in the years 1900-1902. He received the Murchison Fund in 1875 and the Lyell Medal in 1885. In 1879 he was elected Fellow of the Royal Society. He was elected a Foreign Member of the Philadelphia Academy in 1878, of the Imperial Geological Institute of Vienna in 1880, of the Imperial Society of Naturalists of Moscow in 1889, and of the Senckenberg Natural History Society of Frankfurt in 1895. He became a Corresponding Member of the Imperial Academy of Sciences, St. Petersburg in 1902, and a Fellow of King's College, London, his own College, in 1905.

His works and specimens remain a living testimony to his memory and a fundamental contribution to the understanding of the evolution of the reptiles, particularly those of South Africa.

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SUPPLEMENTARY LETTERS OF SIR JOSEPH BANKS

BRITISH MUSEUM NATURAL HISTORY

Edited by WARREN R. DAWSON

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
HISTORICAL SERIES Vol. 3 No. 2
LONDON: 1962

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9 OCT 62
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Pp. 41–70

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical Series.*

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SUPPLEMENTARY LETTERS OF SIR JOSEPH BANKS

Edited by WARREN R. DAWSON

PREFACE

SINCE the publication in December 1958 by the Trustees of the British Museum of *The Banks Letters* in which over 7,000 letters were calendared, a number of further letters has become available.

Of the 139 letters summarized in the present publication, there are four important series, viz.: (1) 38 letters from Banks to the antiquary Francis Douce, in the Bodleian Library ; (2) 28 letters from Banks to the second Earl Spencer, In preserved in the Muniment Room at Althorp, Northamptonshire, (3) 26 letters from Banks to Dawson Turner, in the Library of Trinity College, Cambridge; and (4) 16 letters from Banks to Matthew Flinders and his wife, now in the possession of Miss A. Flinders Petrie.

Several letters are included from copies of which the originals are in American Libraries ; there is also a small series relating to the appointment of a Chaplain to Banks whilst holding the office of High Sheriff of Lincolnshire in 1794, which were originally in the Evidence Room at Revesby Abbey. The remainder are miscellaneous in character, and among them are ten letters which were inadvertently passed over when *The Banks Letters* was in preparation.

The thanks of the Trustees are due to the Keeper of Western Manuscripts, Bodleian Library, to the present Earl Spencer, to the Librarian of Trinity College, Cambridge, and to Miss Petrie for their kind permission to include in this Supplement the four series of letters mentioned above

The method of presentation in this Supplement is the same as that of *The Banks Letters*, but to several of the letters, or groups of letters, I have added some explanatory notes. Letters marked with an asterisk are those written by Banks himself.

ALLAN, Thomas, F.R.S. (1777–1833) Mineralogist.

1. Soho Square, 1819 July 31.* Sympathises with the preference for a Scotsman for a Chair in Edinburgh Univeristy ; he has pleasant recollections of the literati of Edinburgh he met during his stay there in 1773 ; Babbage, a young mathematician has gone there in the hope that [John] Leslie would be appointed to the Chair of Natural Philosphy thereby vacating that of Mathematics for which he is a candidate ; the prospects of [Thomas] Jackson of St. Andrew's for the Chair of Natural Philosophy. [The Brentford postmark shows that this letter,

though dated from Soho Square, was written at Spring Grove. The letter is addressed to " Thomas Allene or Allen." The original is in the Library of Lehigh University, Bethlehem, Penn.]

Dawson MS. 46. 105.

The Chair of Natural Philosphy at Edinburgh became vacant on the death of John Playfair in 1819, and John Leslie, who was already Professor of Mathematics, was the successful candidate. Leslie's candidature for the Chair in 1805 was opposed by the Church Party owing to his supposed heterodox views, but he was nevertheless duly appointed. (See *B.L.* pp. 531–532, Nos. 8–11). Jackson mentioned in the letter, was Professor of Natural Philosophy at St. Andrew's. William Wallace succeeded Leslie in the Chair of Mathematics for which Charles Babbage was a candidate. In his *Passages from the life of a Philosopher*, 1864, Babbage says, (p. 474) : " In 1819 the Professorship of Mathematics was vacant by the death of Playfair and the succession of Professor Leslie to his chair. I immediately became a candidate and received testimony of my fitness from Lacroix, Biot and Laplace. These communications, though gratifying to myself, were useless for the object. Not being a Scot, I was rejected at Edinburgh."

BELL, Thomas John. (1759–1819) Town Clerk of Lincoln. (*B.L.* p. 44).

7. Soho Square. 1794 Feb. 26.* Considers his cousin, the Rev. George Filmer, the most suitable person to be his Chaplain [during his office of High Sheriff] ; failing Filmer, he suggests the Rev. Robert Chaplin or his brother William, to whom he has written ; if all of these fail, he requests Bell to find a Chaplain.

B.M. (*N.H.*) *Banks Corr.* 184.

Banks was appointed High Sheriff of Lincolnshire rather unexpectedly and out of turn. The reason was the desire of the Corporation to have a strong man in office to deal with the Militia and the defence problems of the county. The Rev. G. Filmer's relationship was probably on the side of Lady Banks as the Filmers were a Kentish family. The name does not occur in the Pedigree of the Banks Family, (*Dawson MS.* 47.3.) The Rev. Robert Chaplin (d. 1839), was a member of the well-known Lincolnshire family of which the present Viscount Chaplin is a descendant. (See *B.L.* p. 212, and insert there the dates of Charles Chaplin, 1759–1821). The Rev. William Chaplin, a younger brother of Robert, was Rector of Raithby and died in 1835.

BLIGH, William, F.R.S. (1754–1817) Naval Officer. (See *B.L.* pp. 106–108.)

24. Soho Square. 1787 Nov. 15.* Informs Bligh that one pound of arsenic is sufficient to destroy all the rats and cockroaches on the voyage if properly economized, but if his officers do not know how to administer it in sufficiently small quantities, 2 lbs. should be amply sufficient.

B.M. (*N.H.*) *Banks Corr.* 183.

This letter is one of the many that passed between Banks and Bligh during the long period when the *Bounty* was awaiting favourable weather to sail. Most of these letters are in the Mitchell Library, Sydney.

BROUGHAM, Henry Peter, Baron Brougham and Vaux, F.R.S. (1778–1868). Lord Chancellor. (See *B.L.* p. 154.)

6. Soho Square. 1799 July 21.* Replies to queries as to the weather when Banks visited the Western Isles and Iceland in the *Sir Lawrence* [in 1772] ; it was uniformly fine ; sailors have a dread of being captured by the French and the harsh treatment they receive ; he concludes that Brougham has quite made up his mind to attempt the voyage in spite of the dangers on the coast of Norway ; recommends a tour of Sweden for its mineralogical and other scientific interest, and also a visit to Denmark though he knows little of that Kingdom. [The original is in New York Public Library. T. B. Myers Coll. 2285].

Dawson MS. N.B. 179. 3–4.

7. Revesby Abbey. [1799. Sept. or Oct.]* Having few friends in the countries Brougham intends to visit, he cannot help with letters of introduction ; urges him to postpone the journey on account of the health of his aged father, but if he persists, he will give Br. letters to Archbishop Troil of Stockholm and to [Peter Simon] Pallas of St. Petersburgh. [The original is in New York Public Library, T. B. Myers Coll. 2287].

Dawson MS. N.B. 179. 4 vo.

Brougham had evidently asked Banks for information respecting a tour he proposed to make in Northern Europe. In the first letter the name of the ship in which Banks made his expedition to Iceland in 1772 is mentioned. I found it for the first time in the passport issued by the Danish Government through Diede von Fürstenstein in London, dated 2 July, 1772 (*B.L.* p. 260). The document is in Latin, and the ship is named in the heading of the list of persons in Bank's party in the following terms :

> " Designatio omnium comitum generosi Josephi Banks, Armigeri, cujus sumptibus Navis, Laurentius dicta, & per Navarcham Johannem Hunter vehenda, instructa est."

The name of the ship is nowhere stated in the various biographies of Banks. In his letter to Brougham Banks gives it as " Sir Lawrence " whereas in the passport it is called simply "Laurence." The first port of call was Plymouth and *Lloyd's List* of 28 July 1772 reports a vessel " St. Lawrence ", Master Hunter, arriving at Plymouth on 24 July and sailing for Iceland next day. Lloyd's Agent may have written " Sir ", in the manner usual at the time, as " S$^{\text{r}}$ ", which was mistaken for " S$^{\text{t}}$ " by the printer.

BROWN, Robert, F.R.S. (1773–1858) Botanist. (See *B.L.* p. 172.)

15. Sydney. 1803 Aug. 6. This long dispatch, (10 pp.), deals mainly with the following subjects :—Has written twice since July, 1802, from Cumberland Island and from Timor ; Capt. Flinders is to return to England for another ship to finish his survey ; he (Brown) and Bauer, (*B.L.* p. 39) will remain but Allen will return home ; death of Peter Good from dysentery ; plans for botanical exploration

during the absence of Flinders ; results so far in Zoology and Mineralogy have been poor ; of plants, about 2000 species have been observed of which 700 or 800 are new ; describes his method of writing descriptions of which about 1600 are done ; is sending only a few plants by *Porpoise* in one puncheon, the rest, packed in two puncheons, will follow by the first opportunity ; the garden, [i.e. living plants], is embarked in *Porpoise*, containing what is left of that in *Investigator* which suffered severely ; has sent lists and boxes of seeds, some of which are for Kew ; difficulties in obtaining proper boxes have led to using puncheons which are not wholly satisfactory ; specimens on board during the cruise suffered much from mice and insects ; anatomical details of Monotremata ; difficulty of procuring a gardener to take charge of living plants ; requires a new supply of botanical paper ; Bauer will give an account of his activities in drawing ; [William] Westall is returning with a small collection of plants, birds and shells. [Received by Banks 14 Aug. 1804 ; follows *B.L.* 173, No. 7].

B.M. Add. MS. 32439, 104–108.

16. Sydney. 1803 Sept. 14. Announces loss of *Porpoise* and of all the collections on board except boxes of seeds some of which may still be serviceable ; the lost garden comprized the best specimens, of some of which there are fortunately duplicates ; hopes for an opportunity of visiting Van Diemen's Land and Norfolk Island ; a new species of *Didelphis* has been found of which James Inman, [1776–1859, Astronomer to the expedition], has two living animals which he hopes to send home, but if they die anatomical examination will be made ; observations of the Hystrix, [*Echidna*] ; has procured boxes from the wreck of *Porpoise* in which to raise living plants. [Draft or copy with many corrections, deletions and interlineations. Follows *B.L.* p. 173, No. 7]

B.M. Add. MS. 32439, 131–132.

17. [Sydney 1805] — — Sends as desired particulars of the death of Peter Good who succumbed to dysentery, 11 June, 1803 ; his effects have been sold, excepting his papers which are now in his, (R.B.'s) possession ; W. T. Aiton is his executor, his will having been made before he left England.

B.M. Add. MS. 32439, 100.

The foregoing three letters of Robert Brown were inadvertently omitted from the series in *B.L.* pp. 172–174.

CARLISLE, Sir Anthony, F.R.S. (1768–1840) Surgeon. (See *B.L.* p. 201.)

5. Revesby Abbey. 1808 Oct. 23.* Although he has a high opinion of C.'s talents and ability, he would not venture to recommend to the Royal Academy any person for an office for which the qualifications are best judged by members of the [medical] profession ; he will always testify as to C's talents when it can be done without creating invidious comparison with other deserving persons. [Original in the Library of the American Philosophical Society of Philadelphia].
Dawson MS. 46. 101.

Carlisle was a candidate for the Professorship of Anatomy at the Royal Academy of Arts. There were three candidates, all well-known anatomists—Joshua Brookes, Carlisle and Charles Bell. The minutes of the General Assembly of the R.A. of 3 Dec. 1808 read as follows :—

> "It being the Day appointed to elect a Professor in Anatomy in the room of Jno. Sheldon, Esq. Deceased—Proceeded to the Election. Candidates Joshua Brooks, Anthony Carlisle & Charles Bell Esq^{rs}
>
> " The President then declared Ant^{y} Carlisle duly Elected Professor in Anatomy in the Royal Academy."

CHAPLIN, Rev. Robert. (d. 1839) Vicar of Tathwell.

1. [Soho Square. 1794 Feb. 26]* Having been appointed rather suddenly to the office of High Sheriff, he is informed by Bell that it is necessary to nominate a Chaplain ; in view of the long friendship between their families, he requests Chaplin to undertake the office ; in case C. is unable to accept, requests that he should ask his brother William to do so ; the matter is urgent as the sermon has to be preached on 9 March.
B.M. (*N.H.*) *Banks Corr.* 185.

See the remarks s.v. T. J. Bell, above.

DOUCE, Francis F.S.A. (1757–1854) Antiquary.

1. Soho Square. 1808 Jan. 3.* [Dated in error 1807]. Acknowledges gift of D.'s work, [*Illustrations of Shakespeare,* 2 vols. 1807] and encloses a commentary on certain passages.
Bodleian MS. Douce d. 21. 75.

2. [Soho Square. 1808 Jan. 3]* Enclosure in No. 1, headed " Memorandums on Reading M^{r} Douce's very interesting illustrations 1807–1808. Commentary on 30 passages containing many valuable observations. (4 pp. folio).
MS. Douce d. 29. 61–62.

3. Soho Square. [1808] Mar. 6.* Thanks D. for his appreciation of the commentary; criticizes two statements made by Stephen Weston on phrases used by Shakespeare.
MS. Douce d. 29. 59.

4. Soho Square. [1808] Mar. 24.* He has kept so long the *Novae Narrationes*, [an early law book, printed twice by Pynson in undated editions and then by Tottil in 1561], as he wished to consult Dr. [Maxwell] Garthshore as to the meaning of a certain gynaecological term ; rape in Common Law and its interpretation.
MS. Douce d. 29. 42–43.

5. Soho Square. 1808 Apr. 16* Returns the book of Randle Holm, [*Academy of Armoury*, 1688], and comments on his mention of caterpillars and the ducking-stool ; a dialogue attributed to Gervase of Tilbury, [early 13th century].
MS. Douce d. 21. 163.

6. Soho Square. [1808] Dec. 14.* Apologises for not returning a letter as it had been hidden in his drawer by Dr. Robert Brown and only just found ; he has sought in vain for the word Pavade ; description of tippets and hoods ; considers Pavise and Pavade to be unrelated words ; etymology of Bodkin—a poignard carried in a pouch.
M.S. Douce d. 29. 54.

7. Soho Square. [1808] Dec. 15.* He wishes to censure the Dean and Chapter of Lincoln for selling the lead of two spires and the books in the library of the Cathedral ; he cannot induce D. to accept his reading of Pavade ; considers the word Bedel or Beadle was degraded in popular language to mean Executioner ; Costrell Cups and their ceremonial carriage by pages or soldiers.
MS. Douce d. 29. 37–38.

8. Soho Square. [1809 Jan.?]* [Dated " Sunday Morn."]. Long discussion of the nature and uses of hoods and tippets in medieval dress, quoting Chaucer, Holm and Knighton ; the corresponding female hood was called a Liripipe, [Liripoops], and gives instances of the use of the word.
MS. Douce d. 29. 44–45.

9. Soho Square. [1809] Feb. 16.* Thanks D. for correcting his wrong impression that the Clopir was the cover of a cup, and is now satisfied that it is the same as Claquette or Castagnette ; further discussion of Hoods and Liripoops ; believes the " calle " which covered the head of Elizabeth [of York] when she married Henry VII to be a caul or cowl.
MS. Douce d. 29. 47.

10. Soho Square .[1809] Mar. 19.* Informs D. that a letter-book of Lord Capel when Lord Lieutenant [Lord Justice, 1693] of Ireland is for sale by the bookseller Denley ; the book formerly belonged to Richard Oldworth.

MS. Douce d. 29. 40.

11. Soho Square. [1809?] Apr. 16.* Returns a book of which his sister has a copy ; she will be happy if D. will call to inspect her Archery collections and compare notes.

MS. Douce d. 29. 55.

12. [Soho Square. 1809?—]* Returns D.'s books by his sister, being unwilling to entrust them to any other hand ; thanks D. for his correction of the meaning of Clopir. [End missing.]

MS. Douce d. 29. 58.

13. Soho Square. [1809?]—[From Miss Banks, dated " Saturday "]. Returns a book (not named) and asks for the next two volumes ; begs to keep R. Brooke a little longer. [Sir Robert Brooke, *La Grande Abridgement*, 1576].

MS. Douce d. 29. 30.

14. Soho Square. 1809 Dec. 7.* Returns thanks for the loan of " a curious paper ", not specified.

MS. Douce d. 21.240.

15. Soho Square. [1810] Apr. 13.* Mentions the occurrence of Mazer Cups in the Hundred Rolls ; he is informed by Dryander that Mazur in Swedish and Danish signifies wood that has grown into knots or bosses ; he has seen a chest and other objects made from elm-knots which were highly valued.

MS. Douce d. 29.35–36.

16. Soho Square. 1810 Apr. 22.* Encloses a letter from the Dean of York on Mazer Bowls ; he suggests that in Shakespeare's time the word had been corrupted into Measure.

MS. Douce d. 22.12.

17. Soho Square. 1810 Dec. 10.* Discusses the portion of medieval dress known as Cod Pisses, [Codpieces] and an analogous portion of feminine dress.

MS. Douce d. 22. 33.

18. Spring Grove. 1813 Oct. 2.* Describes the microscopical observations of Baron Munchausen who claims to have found living animalcules in an infusion of grain, which are really Fungi ; by other experiments he sought to prove that the seeds of Fungi are " animated eggs " which produce living animalcules turning when dead into vegetable form ; he (B.) himself once

assisted in experiments made by [George] Fordyce which aimed at demonstrating that mushrooms were "animalized vegetables", but as cabbage leaves gave similar results, he attributed the animal element to the manure on which both had been raised and "this most incredible metamorphosis of animal into vegetable" was contradicted.

MS. Douce d 22. 135–136

19. Soho Square. [1816] June 16* Doubts Trandelle's proficiency in English as he translates Gallimenfry [Gallimawfrey] into Paste en Pot; discusses the meanings of Aventoil, Attercop and Ber.

MS. Douce d. 29. 33–34.

20. Spring Grove. 1816 Aug. 31* Comments on the use of the word Woe in a passage of Shakespeare, [*Two Gentlemen of Verona*, Act. ii, Sc. 4] and interprets it by the language of carters to their horses.

MS. Douce d. 23. 13–14.

21. Spring Grove. 1816 Oct. 24* Discusses the etymology and meaning of various words from the root Ber, Bar.

MS. Douce d. 23. 20–21.

22. Spring Grove. 1816 Dec. 30* Remarks on the word Sterling as applied to weights and to coinage and derives it from the Flemish Esterling; there was early intercourse with Antwerp for which, from the time of King John the port was Boston, which had the privilege of being governed by its own officer; the Mark as a division of the Pound Sterling.

MS. Douce d. 23. 34–35.

23. [Soho Square. 1817 Mar. 8]* Comments on a print by Tempesta representing a duck-decoy, [in Antonio Tempesta, *Il primo libbro di chacce di Ucelli*, Rome, 4 Nov. 1598]; it commits certain errors, "evidently a Poetical Licence"; the situation of the Picadilly gaming-house.

MS. Douce d. 29. 50–51.

24. [Soho Square. [1817] Mar. 11.* Describes a map by T. Porter in the library of the Society of Antiquaries showing the position of the Piccadilly house.

MS. Douce d. 29. 32.

25. Soho Square. [1817] Mar. 12.* Further remarks on decoys and on the wearing of ruffs in England; the Piccadilly house was famous for a kind of pastry known as Puffs.

MS. Douce d. 29. 31.

26. Soho Square. 1818 May 13* Returns thanks for the loan of his (D.'s) copy of Minsheu, [*Guide into Tongues*, 1617] with its MS. annotations which he suggests are the author's own, made in preparation for a new edition.

MS. Douce d. 23. 84.

27. Soho Square. [1818] Sept. 11.* Sends a wooden butt to be fitted to the angling rod for Gudgeon-fishing ; describes its purpose and use whereby two fishes can sometimes be caught at one pull.

MS. Douce d. 29. 48.

28. Soho Square. 1818 Dec. 3* Requests permission to call upon D. to inspect his Chinese mythological drawings.

MS. Douce d. 23. 112.

29. Soho Square. 1819 Jan. 27* [Dated in error 1818] Requests the loan of D.'s Chinese roll as he has invited to breakfast a man well versed in the language who may be able to supply useful information concerning it.

MS. Douce d. 23. 72.

30. Soho Square. 1819 June 17.* Returns a book (not named) and apologizes for delay in sending it.

MS. Douce d. 23. 137.

31. Soho Square. 1819 July 3* Regrets he is unable to use his influence in promoting the appointment of D.'s friend (not named), as the office he seeks is purely legal and the appointment is made by the Treasury after consulting the Law Officers, and his recommendation would be impotent when opposed to the Lord Chancellor, the Master of the Rolls, etc.; their late mutual friend (not named) who previously held the office did not seek his (B.'s) interference, and had he done so, it would have been in vain " in order to prevent the interference of Science with Black Letter Patronage."

MS. Douce d. 23. 143–144.

32. Spring Grove [1819] Sept. 6.* [Not in B.'s handwriting]. Invitation from Sir Joseph and Lady Banks to Mr. and Mrs. Douce to dinner, offering to send their carriage to convey them.

MS. Douce d. 29. 39.

33. Soho Square [1820?] Jan. 13* Leland states that in the Act 20 Richard II that recalled from Ireland Belknap, [Robert de Bealknap], Holt and Bergh ; the three man are styled Knights of the Bath ; asks if this designation is correct, for if so, it is the earliest instance of the title K.B.; supposed derivation of the word Bawdy from Baudrier.

MS. Douce d. 29. 41.

UNDATED LETTERS

34. [Dated " Sunday afternoon "]* The game of Pall Mall described by Cotgrave, [Randle Cotgrave, *French and English Dictionary*, London, 1660] ; quotes instances of a specialized use of the word Lightly from Tusser, Stowe and others.
MS. Douce d. 29. 46.

35. [Dated " Wednesday morn."]* The Greater Cursing of the Church in St. Paul's, Canterbury, and its mention in Ridley, [*View of Civile and Ecclesiastical Law*, 1607], also its connection with the words Housel and Unhouselled.
MS. Douce d. 29. 47.

36. [Dated " Thursday Even "].* Returns books lent and comments on the words Buxome and Strope ; is pleased that his citation of Cursing was new to D.; sends Wilkinson's edition of Juvenal, 1641.
MS. Douce d. 29. 56.

37. Soho Square. [Dated " Tuesday "]* Requests the loan of D.'s Chinese roll. [See above, Nos. 28, 29].
MS. Douce d. 29. 52.

38. [Soho Square]* He desires to see the inventory of the plate seized by the Barons when Piers Gaveston was imprisoned ; asks for the loan of books that may give information for which he sends his Library assistant to bring them safely.
MS. Douce d. 29. 53.

There are no known letters from Douce to Banks : there was none in the sale of the Banks correspondence in 1886, and it must therefore be supposed that Banks kept these letters on antiquarian subjects in a separate file and did not incorporate them with his general correspondence. If such a file existed, it has, like many others, been lost.

In the present series there are 37 letters and one enclosure, considerable numbers of which are not dated at all, or only partially dated. Of these many can be exactly dated by internal and other evidence, some approximately, and others not at all. The earliest dated letter in the series is dated 3 Jan. 1807, but this is obviously a slip for 1808. Banks frequently makes such an error early in a new year, retaining the previous year-date out of habit.

During the last years of his life when he was often confined to his chair by ill-health, Banks seems to have amused himself with antiquarian studies, particularly with the meaning and etymology of ancient and obsolete words.

FILMER, Rev. George.

1. Soho Square. 1794 Feb. 26.* Having been appointed rather suddenly to the Office of High Sheriff, he overlooked the appointment of a Chaplain and requests F. to undertake it in view of the relationship and friendship of their respective families ; the matter is urgent as the sermon must be preached on 9 March.
B.M. (N.H.) Banks Corr. 186.

FLINDERS, Anne, née Chappell. (d. 1852). Wife of Matthew Flinders.

1. Soho Square. 1804 June 9.* He is quite at a loss to conjecture the manner in which Capt. F. fell into the hands of the French ; from such papers he has seen he presumes the sequence of events from the time of the return of *Investigator* from Timor to Port Jackson, when the ship was condemned as unserviceable : Capt. F. then embarked in *Porpoise* intending to return to England, but when that ship was wrecked, he took passage in another bound for England, and that ship was seized in the Isle de France ; he hopes and expects that Capt. F. will be well treated and exchanged before long ; he is most anxious for his safety, but " his Present Misfortune is one of the calamities of war which you & I must bear with as much patience as we can muster."

Petrie ⟨8⟩

2. Soho Square. 1805 Apr. 29.* He wishes he were able to give any account of Capt. F., but will communicate any information he can obtain ; as he has succeeded in procuring the release of several English prisoners, he has applied for leave to approach his scientific friends in France ; letters were accordingly sent by Prince Pignatelli who undertook to deliver them in Paris ; the letters were delayed in the Prince's baggage at Rotterdam until February and it was not until 10 April that an answer was received ; he had almost lost hope through these long delays when he learned on 5 March that the National Institute of France had unanimously resolved to make a recommendation to the Minister of Marine for F.'s liberation ; this has renewed hope and he will immediately communicate the result when known.

Petrie ⟨9⟩

3. Soho Square. 1806 Aug. 6.* He has great pleasure in announcing that by a letter from Paris he learns that orders have been issued for the liberation of Capt. F. and that his arrival in England may be expected in due course, but it cannot be soon on account of the great distance ; he hopes he will obtain a passage in an American vessel.

Petrie ⟨10⟩

4. Soho Square. 1806 Dec. 29.* He has obtained further information as to Capt. F. ; after many refusals by Bonaparte and applications made to him from different quarters, he at last consented to order Capt. F.'s case to be considered by the Council of State, who on 21 March ordered his liberation ; he has just seen Capt. [Thomas] Larkins, whose ship, the Indiaman *Warren*

Hastings, was taken from him at the Isle de France, whence he has just arrived ; Larkins was not allowed to see Capt. F., but reports that he was in excellent health and has brought letters from him ; when L. left, no vessels from France had arrived, so there must be delay in giving effect to the order for liberation ; in the last letter he (B.) received from France was enclosed a copy of the order, which he sent immediately to the Admiralty.

Petrie ⟨11⟩

5. Soho Square. 1807 May 22.* He regrets to hear that Capt. F., who has so long endured his oppression with manly fortitude, has become low-spirited, but hopes this is only temporary ; he is uncertain what opportunities the French have had of sending the order for liberation ; three copies were made to be forwarded to neutrals, but few neutrals are likely to sail from France to the Isle de France, and American ships usually sail from America to India without touching at the islands ; it is therefore probable that the dispatch sent by the Admiralty to Sir Edward Pellew in December, has before this time reached the Island, which he has reason to believe will be attacked by an English force, which gives hope that F. is, or soon will be, set free.

Petrie ⟨12⟩

6. Barking. 1808 Mar. 28. She has received a letter from her husband announcing that orders for his release have arrived last July ; transcribes an extract from Matthew F.'s letter to her, dated 12 Aug. 1807.

B.M. Add. MS. 32439. 266.

7. Soho Square. 1808 July 19.* He concludes that Mrs. F. has received a letter from her husband by way of America ; he (B.) has just received a letter from him stating that he is in good health, though no time has been fixed for his release ; the disobedience to orders by the General [de Caen] cannot be attributed to any other cause than cowardice ; de Caen suspects that Capt. F. is able to give such information to his brother officers in India as might enable them to attack the island, and is therefore resolved not to let him proceed to any place where he may see any of them soon ; the authenticity of the order is acknowledged and the reason given for delaying its execution is the want of an opportunity of sending him home by a ship that will land him in France, and deprive him of the opportunity of instigating an attack upon the island ; he (B.) trusts that F. now has a passage home in a French frigate which may be captured

and brought into a British port ; he has solicited Lord Mulgrave, as he has other Lords of Admiralty, to obtain for F. the rank of Post in his absence, but has always been answered that there is no instance of promoting an officer whilst a prisoner of war, but has no doubt of a favorable consideration for F. from Lord Mulgrave.

Petrie ⟨13⟩

8. Soho Square. 1810 June 12.* He wishes he could give any encouraging news of Capt. F. ; Government can do nothing in his favour " under the capricious and insolent Government of the Tyrant of France " ; he has left no means untried ; he sent word more than a year ago by a way likely to reach the ears of Bonaparte that nothing but the liberation of F. could induce him to believe that the letters received from Paris were not a deceit, as it seemed impossible that General de Caen would venture to disobey the orders of Bonaparte unless he had secret instructions from France ; there is however a hope : the trade of India has been so seriously injured by vessels from the Isle de France that vigorous measures are to be taken for seizing the Island, and if these succeed, we have the prospect of seeing the Capt. before we expect him.

Petrie ⟨14⟩

9. Revesby Abbey. 1810 Sept. 25.* He has the infinite satisfaction of announcing that Capt. F. has at last obtained his release and is expected in England in a few weeks and that on arrival he will immediately be made a Post Captain.

Petrie ⟨15⟩

10. Boston, [1810] Sept. 28.* Lest the letter he recently sent from Revesby to Spilsby has not yet come into Mrs. F.'s hands, he sends this letter to inform her that news of Capt. F.'s liberation has been received by the Admiralty and that he was at the Cape of Good Hope on his way home when the vessel that brought the dispatches sailed ; he adds that Mr. [Charles Philip] Yorke, First Lord, immediately on hearing the news ordered the rank of Post Captain to be given to him.

Petrie ⟨16⟩

FLINDERS, Matthew, (1774–1814). Explorer and Hydrographer. (See *B.L.* p. 328).

21. Soho Square. 1800 Nov. 16.* Regrets his inability to reply to F.'s letter because of ill-health and asks him to call at Soho Square to discuss it.

Petrie ⟨1⟩

22. Soho Square. 1801 Feb. 19.* Congratulates F. on his appointment as commander of the expedition [to New Holland]; he considers that the provision of the instruments necessary should be put in hand, but wishes to see F. before making formal application, as the precedent of Vancouver, who had no astronomer, must not be followed, but due economy must be observed; hopes that F. has by this time been appointed Lieutenant.
Petrie ⟨2⟩

23. Soho Square. 1801. May 1.* Acknowledges receipt of F.'s letter enclosing copy of his letter to Nepean, [Sec. of Admiralty]; he will take care to modify F.'s orders as far as possible to conform to his wishes; is apprehensive of great danger in tracing a reef on its ocean side where there is no anchorage; the East India Co. have ordered £1200 to be paid to F. for his Table, but decline to interfere in the manner of dividing it among the officers; he (B.) thinks that the officers of the Gunroom Mess should have the same sum as is allowed in India, and that the rest should be allowed to the commander as table-money and to those who mess with him, with an allowance to the gardener and miner, as the real reason of the grant is to encourage scientists in the discovery of things useful to the trade of India, and the commander to find new passages.
Petrie ⟨3⟩

24. H.M.S. Investigator. Oct. 21. The voyage has been prosperous; has reported
Cape of Good Hope. fully to Admiralty and has sent meterological observations which he hopes will be useful to Major [James] Rennell, [*B.L.* p. 697]; hopes to proceed early in December as soon as caulking is completed; he has no news of the arrival of *Lady Nelson* at Port Jackson; if a convict ship should arrive, will write to Governor King asking him to have *Lady Nelson* ready for service by next April; fears that the ill-health of Crosby, [astronomer to the expedition] will necessitate leaving him at the Cape; has learned that *Porpoise* is expected daily. [Received by Banks 22 Jan. 1802. Precedes *B.L.* p. 328, No. 1].
B.M. Add. MS. 32439, 45–46.

25. Soho Square. 1803 Apr. 10.* B.'s copy, in his handwriting but not signed, of the letter entered as *B.L.* p. 329, No. 4. He must have inadvertently sent his own file copy of the letter to Flinders, retaining the signed original, transcribed in *D.T.C.* 14.55–57. The copy ends with the words " I beg my dear Sir that

you will believe me." The original adds the terminal formula

Your very Faithfull
Hble Servt
Jos : Banks.

Petrie ⟨4⟩

26. Isle of France. 1807 Sept. 1. Announces that his books and papers which were confiscated have been restored to him five weeks after the arrival of the order for his release ; is still without information as to the time and manner of his return ; is sending papers to Banks by way of India ; refers B. to his last letter to Marsden, [Secretary of the Admiralty]. [Received by Banks 14 July, 1809. Follows *B.L.* p. 332, No. 19].

B.M. Add. MS. 32439. 256.

27. Isle of France. 1809 Feb. 28. He has seen in the *Moniteur* that the First Lieut. of *Geographe* claims as French the discovery of the S. coast of Australia from the islands of St. Peter and St. Francis to Bass Strait and named it Terre Napoleon ; this is an injustice as the discovery was British and is shown in the charts sent to the Admiralty ; further discussion of false claims to discovery by Baudin's expedition ; hopes that the claims will be repudiated, as he (F.) cannot do so as he is still unjustly kept a prisoner ; renewal of his efforts to have the order for his release put into effect ; has sent his letters by a friendly Frenchman named Desbaynes to whom he has given a letter of recommendation in case of his capture on the voyage by a British ship. [Received by Banks 25 Oct. 1809. Follows *B.L.* p. 332, No. 19].

B.M. Add. MS. 32439. 281–282.

28. Isle of France. 1809 Aug. 3. Although ships have arrived from France, no orders as to effecting his liberation have come ; sends this letter and one to the Admiralty by a French cartel conveying British prisoners of war to the Cape ; Baudin promised to deliver his (F.'s) letter to the French Marine, and asks Banks to support it by application to the National Institute. [Received by Banks 22 May 1810].

B.M. Add. MS. 32439. 294.

29. Norfolk Hotel. London. 1810 Oct. 25. Announces his arrival in England ; has seen [Charles Philip] Yorke, [First Lord of the Admiralty], also [John Wilson] Croker and [John] Barrow, the Secretaries, about back-dating his promotion as promised by Lord Spencer, on whom he will call ; hopes to visit Banks very soon and relate the history of his detention and liberation.

B.M. Add. MS. 32439. 332.

30. Revesby Abbey. 1810 Oct. 31.* Expresses his sincere satisfaction that F. has at last "escaped from the clutches of French Tyranny" and restored to his own country; is also pleased that the First Lord will rate F.'s discoveries on the scale they deserve, and is sure that all that is consistent with the usages and precedents of his office will be done in F.'s favour; he is returning to London on 7 November, "and long to have the pleasure of shaking you by the hand & congratulating you on your present situation & condoling the Evil you have endured."

Petrie ⟨5⟩

31. 7 Mary St. 1812 Oct. 1. The Admiralty has printed and circulated in the Navy
Fitzroy Sq. his memorandum on Magnetism in Ships; thanks Banks for his assistance in printing and distributing the paper of which he encloses a copy; he has also sent a copy to [Joseph] Cotton for the Committee of Shipping of the East India Co.; is now working upon the first volume of his voyage and preparing the charts.

B.M. Add. MS. 32439. 368.

32. Spring Grove. 1813 Aug. 13.* Returns the proofs of F.'s work [*Voyage to Terra Australis in* 1801–3 *in H.M.S. Investigator*, London, 1814], he finds nothing of which he disapproves; he thinks this a good beginning ensuring a good ending.

Petrie ⟨6⟩

33. Soho Square. 1814 Apr. 27.* Approves the dedication of F.'s book and thinks it entirely proper; grieves to hear of F.'s ill-health. [Flinders died on the very day his book was published, 19 July 1814. The dedication was to Earl Spencer, Earl of St. Vincent and the Hon. Charles Philip York, who respectively held the office of First Lord of Admiralty during the period of Flinders's expedition, his detention and his release. Before publication he added Viscount Melville, who was in office at the time of publication.]

Petrie ⟨7⟩

The above letters from *Add. MS.* 32439 belong to the series *B.L.* pp. 328–332, Nos. 1–20, from which they were inadvertently omitted owing to an error in filing the slips.

KYD, Robert. (1746–1793). Army Officer; Founder of the Calcutta Botanic Garden. (See *B.L.* p. 510.)

22. Soho Square. 1792 May 10.* The original of the letter, *B.L.* p. 514, No. 22, calendared from Banks's copy at Kew, is in the Library of the American Philosophical Society of Philadelphia, (Leonard Lyell Album).

Kew, B.C. 2. 60.

LENNOX, Charles, 3rd Duke of Richmond and Lennox, F.R.S. (1735-1806) Master—General of Ordnance. See *B.L.* p. 528.[1]

3. Whitehall. 1786 May 31. The Duke invites B. to a public examination of some of the Gentlemen Cadets at Woolwich on 6 June and subsequently to dinner at the Chocolate House on Black Heath.
Goodwood Papers, Box 29.

4. Whitehall. 1792 Apr. 4. The Duke asks that he may be allowed to purchase from the Royal Society " for the use of our Survey . . . the scaffolding employed by the late General Roy for elevating the great Theodolite " ; he has desired Major [Edward] Williams to show B. the account he has written of the last year's proceedings ; asks for B.'s observations on it before it is copied out fair for the King.
P.R.O. W.O. 46/21.

LONG, Charles, (1768–1838) Statesman ; in 1820 created Baron Farnborough.

1. Soho Square. [1818] June 8*. Informs him that he has paid to Coutts two subscriptions of 50 gs. each for the Ladies Statue, also the balance in the hands of the Committee for erecting a statue to the late Duke of Bedford after all expenses have been paid ; requests him to see that the two subscriptions be entered in the names of Lady Banks and Miss Banks.
Althorp ⟨20⟩

PEARSON & LOGGAN. (See *B.L.* p. 659).

3. Soho Square. 1799 Feb. 16* Sends two instruments of the Board of Longitude signed by the majority of members ; they are dated 13th instant because on the 14th a new promotion of Admirals was made which would have necessitated more signatures ; requests them to inform the Astronomer Royal and take his directions on the matter.
Edinburgh Univ. Library.

4. [London]. 1799 Apr. 12.* Buckton, late printer to the Board of Longitude, persists in delaying the printing [*of the Nautical Almanac*] still in his hands ; as the matter must be brought to a conclusion, instructs them to inform Buckton that his license will be revoked on 15 May next, and without further orders to serve the notice upon him on that date. [Signed also by Nevil Maskelyne, Astronomer Royal].
Edinburgh Univ. Library.

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[1] The official copy of No. 2, (*B.L.* p. 529) is in the Public Record Office, W.O. 46/18 (Board of Ordnance, Master-General's Out Letters, Copies). No. 3 is in the West Sussex Record Office, in the Letter Book of the 3rd Duke, and No. 4 is in the same file as No. 2.

POLLOCK, Sir Jonathan Frederick. (1783–1870) Barrister, later Judge.

1. Soho Square. 1814 Apl. 16.* He has seen Lord Sidmouth who gave a friendly reception and proposed that the matter be referred to his confidential, not official, lawyers ; he informed Lord Sidmouth that he wished P. to have an opportunity of communicating with his advisers which he concludes will be done ; asks to be kept informed.

B.M. Add. MS. 43728. 3.

There is no clue as to the matter here referred to. The letter is addressed " Frederic Pollock Esq 18 Sergeants inn, Fleet Street."

RAIMBACH, Abraham. (1776–1843) Engraver. (See *B.L.* p. 693.)

2. Soho Square. 1803 May 16.* Directions for lettering ticket for the Ball of the Knights of the Bath to be held at Ranelagh ; George Nicol [*B.L.* p. 639, No. 22] will begin printing on Friday, [May 20]. [The original is in New York Public Library, Duyckinck Coll.]

This letter is in reply to that of Raimbach of even date. (*B.L.* p. 693, No. 1).

RAMPASSE, Joseph (fl. 1805–1816) Geologist. (See *B.L.* p. 693.)

3. Soho Square. 1816 Jan. 25.* The delay in answering R.'s letter is due to the Trustees of the British Museum not yet having considered it ; the cases have been unpacked and the officer, [Charles König], whose duty it is to report has found a variety of Porphyry superior to any now in the Museum, but the iron ores, etc., do not appear to him so interesting ; report will be made to the Trustees at their next meeting, but it may not then be considered owing to much other business ; vases executed in this porphyry would not be saleable to collectors who admire antiques but not modern productions. [Precedes B.L. No. 1]

B.M. Add. MS. 42579, 525–526.

SPENCER, George John, 2nd Earl Spencer, F.R.S. (1758–1834) Statesman and Bibliophile. (See *B.L.* p. 777).

8. Soho Square. 1790 Mar. 31* Returns thanks for the gift of a manuscript leaf of Pliny.

Althorp ⟨1⟩

9. Soho Square. 1791 Mar. 21* Expresses pleasure that the book (not named) that he sent is acceptable to the Althorp Library ; Lord S. having offered in exchange the Aldus Dioscorides of 1489, states that as the cost of his gift was trifling he wishes for no return.

Althorp ⟨2⟩

10. Soho Square. 1791 June 1.* Invites Lord S. to dine with him and a party of literary friends amongst whom is Sir William Hamilton who has provided a *Sumen* from Naples ; quotes Martial, Plautus and Pliny on *Sumen.*

Althorp ⟨3⟩

11. Soho Square. [1797 Nov. 12]* Acknowledges a paper by Dr. Della Lena which he considers " a most arrant Quack advertisement "; encloses his reply to the author to be sealed and dispatched if approved.

Althorp ⟨4⟩

12. Soho Square. 1799 May 6* Lord Bessborough is to replace Lord S. as a manager of the Royal Institution, but requests the latter to continue until the Charter is sealed, after which Lord Winchilsea will also be elected ; the Institution prospers in finance and in increased membership and the purchase of the house is assured ; Count Rumford " has of late kept himself intirely in the background."

Althorp ⟨5⟩

13. Soho Square. 1799 May 9.* Acknowledges draft for £50, Lord S.'s subscription to the R. Institution ; Hoppner the painter has been proposed by Lord Ossory and seconded by Lord Macartney as a member of The Club, to represent Art like Sir Joshua Reynolds ; anticipates much opposition.

Althorp ⟨6⟩

14. Soho Square. 1800 Dec. 14.* It has been resolved by the Trustees of the British Museum that the meetings of the Standing Committee shall in future be held at two o'clock instead of at twelve ; he is about to recommend Ferdinand Bauer as Botanical Painter to the expedition [of Matthew Flinders] as the post has been declined by Alexander because of his wife's health.

Althorp ⟨7⟩

15. Soho Square. 1802 Apr. 1.* Invites Lord S. to attend a meeting in B.'s house to consider a memorial to the late Duke of Bedford. [Lord S.'s reply is in *B.L.* p. 778, No. 4].

Althorp ⟨8⟩

16. [Soho Square. 1802 Dec. 13].* Sends a journal of the voyage of the French Expedition ; from this it appears that Baudin is too cautious in approaching the shore to make a good navigator, and the commander of the *Naturaliste* too little inclined to keep company to give the principal much assistance.

Althorp ⟨9⟩

17. Soho Square. 1804 Mar. 21.* Presents a collection of Canal plans to add to those already in Lord S.'s possession.

Althorp ⟨10⟩

18. Soho Square. 1806 May 18* On visiting the Transport Office, he finds that Capt. Milius has obtained his passport and has written to inform him of his good fortune [See *B.L.* p. 611, No. 3] ; Milius was on board the discovery ships on the coast of New Holland ; he wishes to obtain the release of the Rev. Mr. Egerton[1]; asks for an appointment to discuss the matter.

Althorp ⟨21⟩

19. Office for Trade. [1806 Nov. 24]* Asks for appointment for interview. [Endorsed by Lord S. " Appointed him for tomorrow at 12½."]

Althorp ⟨25⟩

20. Soho Square. 1808 May 16. Returns the Act of Parliament [relating to the trade in hides and leather], but does not approve all of its provisions, especially those establishing a severe code of penalties on one class of persons for the benefit of another ; the conflict between the butchers and bootmakers ; the former have no direct access to legislators whilst the latter, in supplying them with fashionable boots, can justify their increased charges.

Althorp ⟨11⟩

21. Soho Square. 1809 July 31*. Sends particulars of the sale of the King's sheep [on 26 July] ; 40 rams and 60 ewes fetched £3998 in all ; average maximum prices paid ; absence of those who attended the Duke of Bedford's Sheep-Shearing ; has secured some of the best sheep for Lord S., whose bailiff, [Thomas Vialls] made the choice ; hears that 1500 more sheep have arrived in bad condition, they are part of the flock procured by Cochrane Johnston, [see *B.L.* 477], namely 12,000 sheep in all—4,000 for the King and 8,000 for himself ; understands they will be landed to-day and put in St. James's Park ; Lord Camden wished to buy a ram with a price-limit of 20 gs., but none was sold for less than 25 gs.

Althorp ⟨12⟩

22. Soho Square. 1809 Sept. 2* Regrets he is unable at present to allot any sheep as the ewes are heavy with lamb ; will do his best when the time for distribution arrives ; the next importation is at Seville and he is requesting the transports to embark them at St. Lucar, which saves driving them nearly 100 miles.

Althorp ⟨13⟩

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[1] Probably the Rev. John Egerton (1749–1825) who succeeded in 1825 as 9th Baronet.

23. Soho Square. 1810 June 17.* Returns thanks for Lord S.'s generous contribution to the fund for the family of [George] Gilpin, [clerk to the Royal Society who died in 1810] ; the main flock of Merino sheep, at least 3,000 in number, has not fallen into the hands of the French ; the Treasury has advanced £600 for their keep ; hopes soon to receive a supply and will then be able to replenish Lord S.'s flock ; at Lord Holland's sale an ewe and lamb sold for 98 gs., and a ram has been let for the season for 142 gs., and another for 107 gs.

Althorp ⟨14⟩

24. Soho Square. 1811 Feb. 12* The arrival of a cargo of the King's Merino sheep renders it necessary to collect a rate on those already delivered, to repay the sum advanced by the Treasury ; applies for £15. 18. 0 for six sheep at £2. 13. 0 per head. [Printed facsimile of B.'s handwriting with blanks for the date and sums of money which are inserted in ink.]

Althorp ⟨15⟩

25. Soho Square. 1811 Feb. 13* He has corrected the mistake in the account ; is now less fettered than formerly and hopes to restore Lord S.'s flock to its original state ; has just received another flock from Spain, but all except five were rams ; hopes to meet Lord S. at the Committee at the British Museum.

Althorp ⟨16⟩

26. Soho Square. 1812 June 29* Recommends his friend Dr. [William Henry] Fitton who is about to set up in medical practice in Northampton.

Althorp ⟨17⟩

27. [Soho Square. 1814 Mar. 18]* Dr. Tiarks has finished his abstract of the contents of " your Lordship's curious Black Letter "; the document is Letters Patent from Maximilian to all his archbishops and bishops empowering them to confer a badge on all ranks and admit them into the Order of Crowned Knights who are to make a Crusade against the Turks then pressing on the frontiers of Hungary ; the Order is otherwise totally unknown ; suggests that Dr. Tiarks should call and explain this precious book which is of great rarity, unknown to scholars and nowhere quoted.

Althorp ⟨18⟩.

28. Soho Square. 1815 July 14* Returns thanks for the gift of the 4th volume of Lord S.'s Library Catalogue. [*Bibliotheca Spenceriana*, by Thomas Frognal Dibdin, 4 vols., 1814–1815].

Althorp ⟨19⟩.

The Correspondence of the second Earl Spencer is preserved in the Muniment Room at Althorp. The present Earl has kindly permitted copies to be made. Most of the letters here summarized are in the files of correspondence during his period of office as First Lord of the Admiralty, 1794–1801, The remainder are from the files for his period of office as Home Secretary, 1806–1807. The letters are not numbered, but for convenience of reference, numbers in angular brackets have been assigned to them.

Althorp ⟨22⟩ is the original of *B.L.* p. 778, No. 5 calendared from *D.T.C.* 16, 312–313; No. ⟨23⟩ is a clerk's copy of *B.L.* p. 581, No. 20; No. ⟨24⟩ is the original of *B.L.* p. 778, No. 7 from *D.T.C.* 16. 317.

THORNTON, William (1759–1828) Physician.

2. Soho Square. 1786 Mar. 31* Returns thanks foı the gift of a mineral; sends seeds of Alexandrian Senna as desired; hopes that T. will be successful in raising the plants to supply the London market which is now dependent on foreigners.

This letter is the reply to that in *B.L.* p. 818, No. 1 which I have wrongly attributed to Robert John Thornton, and the heading should be corrected as above. This Dr. Thornton is William, and his correspondence and papers are in the Library of Congress, Washington, from Vol. 1 of which the above letter is abstracted. It is addressed to "Dr. William Thornton, Tortola, West Indies," and is endorsed "Rec^{d} June 25th 1786." The date in *B.L.* No. 1 should be corrected from [1796 ?] to [1786].

William Thornton was born in Tortola, lived most of his life and died there. He came to Scotland in 1782 and graduated M.D. at Aberdeen 23 Nov. 1784, returning to Tortola early in 1786. His papers include his diaries from 1777 to 1782 and 17 vols., of correspondence, chiefly with men of science.

TURNER, Dawson, F.R.S. (1775–1858). Banker, Botanist and Antiquary. (See *B.L.* p. 834.)

3. Soho Square. 1800 Dec. 6* Returns thanks for the gift of a keg of herrings; offers the free use of his library as it at all times gives pleasure to himself and to Dryander to provide every facility for students of Natural History.

T.C.C. O. 13. 1. 157

4. Soho Square. 1801 Dec. 3.* He has been expecting [Lewis Weston] Dillwyn to look over the Fuci in his Herbarium on Turner's behalf; he is pleased to hear that T. is undertaking to write an account of the British species, [*Synopsis of British Fuci*, 2 vols., 1802]; he hopes the Linnean Society will soon obtain its charter, but the legal delay has caused the loss of William Pulteney's Legacy to the Society which was conditional on its incorporation.

T.C.C. O. 13. 1. 208.

5. Soho Square. 1802 Jan. 25* He considers T.'s proficiency in Botany entitles him to election to the Royal Society; explains the procedure for candidature and invites T. to Soho Square when he will

introduce him to Fellows of the R.S. who have similar pursuits ; it is not customary for the President to sign the certificates of candidates.

T.C.C. O. 13. 2. 6.

6. Soho Square. 1802 May 13.* Returns thanks for the gift of T.'s book, [*Synopsis*, see No. 4] and for the specimens sent with it which are new to his Herbarium ; asks T. for the names of those of his friends, who will support his candidature at the Royal Society.

T.C.C. O. 13. 2. 25.

7. Soho Square. 1802 May 20.* He has seen T's friends and has obtained the signatures on his certificate of Sir Thomas Cullum, Major Rennell, Charles Greville and Dr. Maton. [Turner was elected F.R.S. 9 Dec. 1802].

T.C.C. O. 13. 2. 21.

8. Soho Square. 1803 Jan. 12* Returns thanks for the gift of Christmas parcel ; urges him to keep his (B.'s) specimens of Fuci as long as he needs them ; he has received a seaweed from China which on analysis proves to consist wholly of starch and promises to provide specimens ; he has been confined to his room for seven weeks.

T.C.C. O. 13. 2. 117.

9. Soho Square. 1803 Feb. 7* Returns thanks for the gift of two Brent Geese which were excellent eating ; comments on the matrimonial affairs of " our old Friend the General ", [Charles Vallancey] ; Wilford has been elected a Foreign Member of the French Institute.

T.C.C. O. 13. 2. 135.

10. Soho Square. 1803 Mar. 26.* He has sent specimens of *Fucus* and *Ulva* to T. by the Yarmouth coach ; begs him to retain them as he will not require their return before Christmas ; gives him permission to keep all duplicates for himself.

T.C.C. O. 13. 2. 149.

11. Soho Square. 1803 May 1.* Returns thanks for the gift of a copy of T.'s *Synopsis* bound by [John Dawson] Downes of Yarmouth and of T.'s reprint of John Ives's work, [*Remarks on the Garianonum of the Romans*, 1803] ; comments on an ancient map in the archives of Yarmouth Corporation ; adverse criticism of [Charles] Vallancey's etymologies. [See *B.L.* p. 834, No. 1].

T.C.C. O. 13. 2. 165.

12. Soho Square. 1803 July 28.* In spite of the conduct of the French, he asks T.'s assistance, in the interests of science, in procuring the release of the copper plates belonging to Pieter Camper's son which

were captured at sea [by a Yarmouth vessel] ; if the captors are inclined to negotiate, he will advance the money for any reasonable price agreed upon and send the plates to France by a neutral ship. [See *B.L.* p. 323, No. 20.]

T.C.C. O. 13. 2. 193.

13. Soho Square. 1803 Aug. 13* Thanks T. for his assistance in the matter of the captured plates ; is pleased that Mr. Friday is handling the matter so that no further interference by T. or himself is necessary.

T.C.C. O. 13. 2. 199.

14. Soho Square. 1805 Jan. 2* [Dated in error 1804]. There is no rule in the conduct of his library that prevents the borrowing of books ; he is sending a parcel containing those asked for by T.; returns thanks for specimens of Roth's plants, a useful addition to his Herbarium ; he will be pleased to receive T.'s cousin and to show him every civility. [This is the reply to *B.L.* p. 834, No. 2].

T.C.C. O. 13. 3. 91.

15. Soho Square. [1805 Feb.—]* Sends specimens of a Chinese Ulva which when dissolved in warm water makes a paste or glue ; he thinks this property worth exploiting to save the expense and waste of wheat-flour used in the manufacture of paste ; he believes this to be the only gelatine of vegetable origin. [Many red Algae have the property of producing agar when dissolved in water, which can be used as a glue : the specimen here referred to is probably a species of *Gelidium* or of *Gracilaria*] ; he has hopes of the recovery of the King.

T.C.C. O. 13. 3. 109.

16. Soho Square. 1806 May 2.* Assures T. that he may keep the specimens of Fuci, Ulvae and Confervae from his Herbarium as long as he requires them ; he rejoices that a bookseller, [Messrs. John and Arthur Arch], has been found to undertake the publication of T.'s large work on Fuci.

T.C.C. O. 13. 4. 61.

17. Soho Square. 1806 June 28.* Regrets that owing to an attack of gout he was unable to go to Holkham ; [Franz Andreas] Bauer is now investigating and painting diseases in corn, [MS. at Kew : *Diseases of Cereals*] ; when this work is finished Bauer may be induced to take up Fuci if specimens can be sent to him in salt water.

T.C.C. O. 13. 4. 88.

18. Soho Square. 1811 Feb. 20.* The death of the Astronomer Royal, [The Rev. Nevil Maskelyne] and the appointment of his successor has occupied much of his time ; discusses netting for protecting fruit-trees, etc., and thinks that fishing nets no longer fit for use at sea could be repaired for garden use, and that old women could make a comfortable living in this way.

T.C.C. O. 13. 9. 10.

19. Soho Square. 1811 Mar. 31.* Thanks T. for his efforts in procuring the netting which suits his purpose well ; discusses the etymology of *Cockile*, derived from a Teutonic word ; the Dutch formerly came to Norfolk and kept retail shops for the sale of Lent wares and fish ; he quotes Thomas Tusser [*Hundreth Goode Pointes in Husbandrie*, 1557] ; he has received Hooker's book on Iceland but thinks that H.'s recollections of the Revolution are at fault, and that there is too much Botany for a general reader and not enough for botanists ; he has received plates of H.'s *Jungermanniae*, [finished and published in 1816] which he commends ; he has advised H. to give up his intention of going to Ceylon ; he has seen little of Gerard, [F. Giraud, See *B.L.* p. 358] who has come to England to obtain a Patent invented by another man for a method of preserving meat.

T.C.C. O. 13. 9. 24.

20. Soho Square. 1811 Dec. 19.* Returns thanks for the gift of a palatable dish, (not named) ; description of a vegetable called by Americans and West Indians " Squash ", [*Cucurbita moschata*] ; he has advised Hooker to insert a map of Iceland in his new edition, especially as Sir G. M. [Sir George Steuart Mackenzie, *Travels in Iceland*, 1811] has omitted to do so, [cf. *B.L.* p. 422, No. 10] ; a copy of Acharius's work, [*Lichenographia*, 1810] is in the hands of [George Jasper] Lyon who would probably lend it to Borrer ; asks T. to convey to Mrs. Merry, [Elizabeth, wife of Anthony Merry, then Envoy to U.S.A.], his thanks for articles sent from North America.[1]

T.C.C. O. 13. 9. 59.

21. Soho Square. 1814 Jan. 10.* He is in good health " legs excepted "; he has been so long deprived of the use of them as to have no regrets ; gout returns less frequently and is dispelled by Eau Medicinale ; he has entertained T.s' friend, Mr. Taylor ; hopes for the return of peace and the renewal of correspondence with foreign friends ; sends greetings to Hooker whom he suspects to be contemplating marriage. [Hooker married in 1815 T.'s eldest daughter].

T.C.C. O. 13. 11. 5.

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[1] See *B.L.* p. 608 and insert the dates of Anthony Merry, (1755–1835).

22. Soho Square. 1817 May 4.* Laver, Dutsh and Tangle, edible seaweeds, are used by the Scots and Irish ; he thinks that many other species might make a useful aliment if suitably prepared and suggests experimenting with Common Sea-wrack simmered for 30 hours.

T.C.C. O. 13. 13. 61.

23. Soho Square. 1817 July 16.* Returns thanks for an abnormal shilling which has been placed in his sister's coin collection ; he will enquire about it at the Mint,; acknowledges a script in an unknown character which he has placed in the hands of [Sir Charles] Wilkins the Sanscrit scholar ; laments the misfortunes of Dr. Able, [Clarke Abel] in China and the loss of his collections.

T.C.C. O. 13. 14. 13.

24. Soho Square. [1817] July 26.* He recommended Dr. [Joseph] Arnold to Sir Thomas [Stamford] Raffles as a suitable person to proceed to Sumatra ; the amount of his emolument is not settled as the Chairman [of the East India Co., John Bebb,] wished to fix a salary, but Raffles prefers to have the power to remunerate him according to his services ; he thinks that [George] Psalmanazar's *History of Formosa*, [1704], might throw light on the unknown script ; mentions Charles Vallancey, whom he has missed " since he set out on his journey to Kingdom Come," [he died in 1812] ; Dr. Sickler[1] has been brought to England to unroll the Herculaneum Papyri ; though his first attempts were not successful, he wishes him better fortune in his further efforts.

T.C.C. O. 13. 14. 24.

25. Soho Square. 1817 Nov. 29.* Returns thanks for gift of herrings ; he has had a kind of red herring procured from Canterbury ; mentions the decrease in the ice on the coast of Greenland, [see *B.L.* p. 739, Nos. 4–6], and hopes this will have a beneficial effect on the English climate ; he thinks it probable that ships will be fitted out to seek the N.W. passage.

T.C.C. O. 13. 14. 125.

26. Soho Square. 1819 Sept. 21* Returns thanks for gift of herrings ; his health has improved after suffering from jaundice for three months during which time there was no return of gout, but it came on afterwards and was cured in one night by taking Colchicum ; he has just obtained from Denmark a book on Fuci and fresh-water Cryptogams which he now presents to T. as he had

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[1] Dr. Friederich Carl Ludwig Sickler, (1773–1836) a German archaeologist, was engaged to treat, by chemical methods, some of the 18 rolls presented to the Prince Regent. In the course of his experiments seven rolls were completely destroyed.

received a second copy as a gift. [The book is *Tentamen Hydrophytologiae Danicae,* by Hans Christian Lyngbye, Hafniae, 1819].

T.C.C. O. 13. 19. 73.

The foregoing letters from part of the Dawson Turner correspondence, bound in order of date in 82 volumes, presented to Trinity College, Cambridge, in 1891 by his last surviving daughter, Eleanor Jane (1811–1893), widow of Dr. William Jacobson, Bishop of Chester.

During the period covered by the present letters, 1800 to 1819, Turner's principal interest was Botany, and he was then at work, first, on his *Synopsis of British Fuci,* (1802) and then on his large monograph, *Fuci,* in 4 vols., quarto, to aid in which Banks placed the specimens in his own Herbarium at Turner's disposal and sent them to his house in Yarmouth where they were retained for some years and eventually returned to Soho Square.

The volumes of Turner Correspondence are not numbered ; the references are accordingly to the press-marks, with the serial number of each letter in the respective volumes.

VINCENT, Very Rev. William (1729–1815) Dean of Westminster.

1. Soho Square. 1804 Mar. 7.* Returns thanks for the loan of a memoir on the ancient map preserved in the church of San Michele, Murano ; he doubts the position of Cape Diab, but concludes that as the Portugese were exploring the western coast of Africa during the second half of the 15th century, the latitude of the cape will afford a clue as to the date of the map.

Blofield Coll.[1]

The map referred to is the circular map of the world by Fra Mauro, completed in 1459, for many years kept in the Church of San Michele but now in the Biblioteca Marciana. The memoir is that of Placido Zurla, entitled *Il Mappamondo di Fra Mauro camaldolese,* Venice, 1806. The Dean of Westminster evidently had the proofs or an advance copy of the work, which he lent to Banks. The map shows an open sea passage to the south of Africa, with a large island called Diab approximately in the position of Madagascar. I am indebted to R. A. Skelton, Esq., Keeper of the Map Room, B.M., for this information.

WEDDERBURN, Alexander, Baron Loughborough, afterwards first Earl of Rosslyn. (1733–1805). Lord Chancellor. (See *B.L.* p. 862.)

3. [London]. 1794 Mar. 2. Offers to Banks the disposal of the benefice of Barrow-on-Humber, but stipulates that residence is a condition ; relies on B.'s good judgement in the choice of a Vicar, especially now that he holds the Office of High Sheriff.

B.M. (*N.H.*) *Banks Corr.* 187.

4. [Soho Square]. 1794 Mar. 3.* Returns thanks for the offer made and agrees that whenever possible it is proper to enforce residence ; in the present case, however, he had intended to nominate the Rev. Caley [Cayley] Illingworth, but which he cannot do if the condition is unalterable as he resides on his living of Scampton,

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[1] An album of autograph letters brought together by two or more generations of the family of T. R. C. Blofield, Esq., of Hoveton House, Wroxham, Norfolk. A. N. L. Munby Esq., Librarian of King's College, Cambridge, kindly obtained for me a photograph of the letter.

This letter is in the third person, and the Dean is not named.

25 miles south of Barrow; in a case of plurality, if Lord L. is satisfied if the incumbent resides on one of the livings, Illingworth will be unexceptionable.

B.M. (*N.H.*) *Banks Corr.* 188.

The Rev. Cayley Illingworth (1758–1823) was of Pembroke College, Cambridge, M.A., D.D.; Rector of Scampton and afterwards Archdeacon of Stowe. He was an antiquary, and published *Account of the Parish of Scampton in the County of Lincoln and of the Roman Antiquities discovered there*, 1808.

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TRUSTEES OF
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SUPPLEMENTARY LETTERS OF SIR JOSEPH BANKS

Second Series

Edited by WARREN R. DAWSON

FOREWORD

In this *Bulletin*, Historical Series, Vol. 3, No 2, (1962), 139 letters were calendared additional to those in the main work, *The Banks Letters*, published by order of the Trustees in 1958. In the present part 64 further letters are presented. Most of these are contained in a collection of miscellaneous papers relating to Sir Joseph Banks which was acquired by the Department of Manuscripts of the British Museum in 1963, and numbered Add. MS. 52281. To these are added a few letters from other sources.

The method of presentation is the same as that of *The Banks Letters*, but as in the First Supplement, explanatory notes have been added where necessary. The letters from writers whose names already occur in the original work and/or in the first Supplement, are numbered consecutively with those already calendared, and as before, letters written by Banks himself are marked with an asterisk.

ASTLE, Thomas, F.R.S. (1735–1803) Keeper of Records, Tower of London.

1. Soho Square, 1802 Aug. 19.* He has great respect for Dr. Marcet and happy to be useful to him ; in the present case, as the Governors of Guy's Hospital make their own decisions as to vacancies on the staff, no opposition is likely.

B.M. (N.H.).†

Alexander John Gaspard Marcet, M.D., F.R.S., (1770–1822) was a candidate for the post of Physician to Guy's Hospital, and his friend Astle had asked for B.'s support to meet any opposition there might be. Marcet was duly appointed.

BAILEY, Francis. (Of Newbury, Berkshire)

1. Soho Square 1799 June 11.* States that there is little likelihood of any person being engaged by the African Association, the funds of which are limited and will not admit of more than one person at a time being employed, and there is at present one explorer in Africa ; reminds the applicant that he has

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† Inserted in a copy of Edward Smith's *Life of Banks*. An account of this book and of the documents inserted in it, was published by Dr. Averil Lysaght in *Journ. Soc. Bibl. Nat. Hist.*, Vol. 4, pt. 4 (1964), pp. 206–209. Edward Smith, published his book in 1911, and died at Whitstable, 13 Dec. 1919 in his 81st year.

given no account of his qualifications and experience; advises him to read Mungo Park's book from which he will learn the qualities and acquirements necessary to an explorer in Africa.

Bodleian, *MS. Autogr. d.* 14. 2.

It is not known if Bailey renewed his application and furnished particulars of his qualifications. He was never employed by the African Association.

BAUER, Franz Andreas, (1758–1840) Botanical Artist. (See *B.L.* p. 40).

3. Kew. 1813 Aug. 31. Declaration signed by Bauer that all the drawings he has made are the property of B. from whom he has received an annual salary; he further declares that all future drawings he shall make during the continuance of the salary shall likewise be the property of B.

B.M. Add. MS. 52281. 107.

BRACKENBURY, Joseph (1753–1811). Clerk of the Peace for Lindsey (See *B.L.* p. 149).

4. Spilsby 1792 June 4. Sends by command of the Duke of Ancaster a copy of the printed Proclamation, dated 21 May, 1792, against seditious propaganda.

B. B.Add. MS. 52281. 13.

The heading of the entry in *B.L.* 149 is to be amended as above.

BROUSSONET, Pierre Marie Auguste, F.R.S. (1764–1807) Botanist. (See *B.L.*. p. 155).

134. Soho Square. [1789] May 1.* At yesterday's meeting of the Royal Society, the following were elected Foreign members: [Claude Louis] Berthollet, [Pierre Simon, Marquis de] Laplace, [Jean Dominique, Comte de] Cassini, [Adrien Marie] Le Gendre, and [Pierre François André] Méchain; [Antoine, Baron] Portal had too many black balls, and if he means to succeed, he must apply again at a future date; some felons have refused pardons granted on condition of their settling in Australia, as they seem to prefer death to banishment; the ship bringing curiosities for B. has not yet arrived, but when it does so, he will send Br. a Kangaroo. [Follows *B.L.* No 86].

St. Andrew's University, Chemical Dept.
Miscellaneous MSS.†

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† Formerly the property of the late Professor John Read, F.R.S.

BUGGE, Thomas, F.R.S. (1740–1815). Astronomer. (See *B.L.* p. 183).

17. Copenhagen. 1812 May 12. Regrets the long interruption of his correspondence, due to the war, for which he blames the English Ministers ; the bombardment of the Danish capital caused great damage to the University and the Cathedral ; his own house was burned to the ground and the whole of his library of 8000 volumes was destroyed ; his family fortunately escaped injury ; a young pupil of his, Lieut. Wormskiold, well versed in botany and astronomy, has made a scientific expedition to Greenland ; asks for B.'s intervention to save his observations and collections, as B. is regarded as the tutelary deity of Iceland, and he hopes of Greenland also ; the collections have been landed at Leith and he begs B. to recover them and house them in his library ; the Observatory luckily suffered little damage. [*French*].

Bodleian. *MS. Eng. Hist.* d. 150. 89–90.

CARTWRIGHT, John. (1740–1824). Political Reformer.

1. Brothertoft 1799 Sept. 19. Thanks B. for terminating their previous intercourse " which it seems was no longer likely to have been cordial " ; states his political opinions and his differences with B. [Written in the third person].

B.M. Add. MS. 52281. 27.

CHISLETT, John. (d. 1793). Surgeon.

1. Horncastle. 1792 Dec. 13. Asks B. to nominate the clergyman to preach the Anniversary Sermon for the [Medical] Charity ; [Thomas] Paine's adherents in the County are not numerous but are very audacious and have circulated inflammatory literature ; the farmers on market-days have given loyal toasts in consequence of the affrays which have occurred in public houses ; in one of these, a loyalist received a blow and soon after died ; the post-mortem, however, revealed a pre-existing state of gangrene which was the cause of death and the Jury's verdict was death from natural causes ; at Boston there are disaffected persons and the singing of " God Save the King " was greeted with hisses ; many labourers want a disturbance that they may commit depredations ; he hopes that Government and the Magistrates will be active and inflict condign punishment ; applies for the tenancy of two of B.'s closes which will soon become vacant.

B.M. Add. MS. 52281. 14–15.

§

CLARK, Richard. (1739–1831). Chamberlain of the City of London.

1. Spring Grove. 1813 Oct. 3.* Discusses the claim of the Lord Mayor of London to take the place of the Heir Apparent to the Crown within the jurisdiction of the City, which was asserted at the funeral of Lord Nelson, and admitted *pro hac vice* ; he has searched for precedents of the rank in which the Lord Mayor has been anciently placed in processions, funerals, etc. ; he finds that the Lord Mayor is always placed by the side of Garter King of Arms, between the convoy and the procession ; he finds also that the Lord Mayor always carries what is called the City Sceptre, a small mace ; asks whether this article is preserved amongst the regalia of the City, or whether the Lord Mayor when proceeding with Garter King carries the full-sized mace upon his shoulder.

B.M. Add. MS. 52281. 130.

The Lord Mayor in 1805 was Sir James Shaw, Bart. (1764–1843). This letter is a copy in the handwriting of Sarah Sophia Banks amongst a number of documents copied by her on the same subject. (ff. 123–131 *vo*). Orders and precedents were subjects in which B. and his sister were greatly interested.

COLE, William. (See *B.L.* p. 223).

2 Gosport. 1803 June 11. Presents the bearer of this letter, [Louis Auguste] Deschamps ; he has secured his release with the assistance of the Rev. Mr. [Richard] Bingham, a magistrate of Gosport ; Mr. Bingham has subjoined a passport for the convenience of Deschamps.

B.M. Add. MS. 52281. 71 *vo.*

3. Gosport 1803 June 14. He has just returned from the Custom House and the Prize Agents ; from the latter he has permission to hand over to Deschamps all the natural history collections with the rest of his (D.'s) property ; he has been instructed to lodge the articles in the Custom House until further orders, when they will permit them to be sent to the Custom House in London to be searched ; he will go on board *L'Union* to arrange their landing ; asks for an Order in Council for the landing and storing.

B.M. Add. MS. 52281. 36.

4. Gosport 1803 June 16. He has visited the Custom House and found there two trunks belonging to Deschamps containing wearing apparel ; he has purchased two padlocks to secure them and encloses the keys ; the trunks will be in London in a few days.

B.M. Add. MS. 52281. 72.

5. Gosport. 1803 June 17. He has visited the French ship to examine the property of Deschamps ; it consists principally of books, with some parcels of plants, shells, insects, etc. ; the Hortus Siccus is much damaged and many specimens destroyed ; these articles are to be lodged in the Custom House ; a small box of lilies will be sent to B. by the wagon ; the Colonel who was a passenger on the ship gave him some substances said to be gold and silver, and a bottle containing scorpions which he sends to B. for his own collection ; Capt. Hamelin presented him with a living parrot which also he proposes to send to B.

B.M. Add. MS. 52281, 35.

6. Gosport. 1803 July 5. Acknowledges B.'s letter about the missing trunks, [*see infra*, MACLEAN, W. No. 3] ; encloses note from the Officer of the Custom House. [The enclosed note, undated and signed Wm. NORRIS, states that two trunks were sent on 17 June addressed to the Warehouse Keeper for the Crown, E. I. Baggage Warehouse, St. Helen's London, and that two others remain, awaiting orders. f 40].

B.M. Add. MS. 52281, 38.

7. Gosport. 1803 July 20. Informs B. that the greater part of the packages [of Deschamps] will be sent by the Portsmouth wagon to the warehouse in London, the remainder to follow in due course.

B.M. Add. MS. 52281. 45.

8. Soho Square. 1803 July 28*. He has had notice of the reception of 4 cases and 2 chests belonging to Deschamps at the London warehouse ; Government appear to be pleased at the liberality of the captors, and will pay for any part of the goods that may have been thought of value sufficient to detain them for the benefit of the crew, in order that they may be sent gratis to Deschamps ; requests Cole to enquire if any further articles relating to Natural History or Science remain on board, particularly drawings ; returns sincere thanks to Cole for his handsome assistance, and requests him to render thanks to the captors and their agents for their liberal and generous conduct, which does honour to the British name and to science.

B.M. Add. MS. 52281. 47.

9. Gosport. 1803 Aug. 2. On his return from Essex, he was pleased to learn that the goods of Deschamps have arrived ; by an error,

some Frenchmen on parole at Bishop's Walton have taken two or three chests with them, an error that can easily be rectified ; the captors have acted with great liberality ; he much values B.'s appreciation of his services ; he is engaged in raising a Defence Corps and has purchased suitable publications for distribution.

B.M. Add. MS. 52281. 50–51.

10. Gosport. 1803 Aug. 16. Encloses the keys of Deschamps's trunks, sent from Bishop's Walton via Winchester ; he has been active in raising a Defence Corps which now musters 250 men ; in a P.S. states that a French prisoner at Bishop's Walton has a valuable collection of butterflies which he wishes to sell. [Attached is an inventory of the contents of the trunks, with a note by B., " Recovered from Bishop's Walton Augt. 18 1803 from Mr. Cole ". f. 62].

B.M. Add. MS. 52281, 61.

DESCHAMPS, Louis Auguste, (1765–1842) Naturalist. (See *B.L.* p. 261).

3. Portsmouth 1803 May 28. Although he has not the honour of being known to B., he, as a naturalist in distress and a victim of the war, appeals for the assistance of B. ; after an absence of 12 years devoted to science, he was naturalist in the *Recherche*, commanded by D'Entrecasteaux, and remained in Java for 10 years, occupied with Natural History and explored this almost unknown country, making a fine collection especially of plants ; he therefore applies to B., the foremost naturalist in England and the companion of Capt Cook, for assistance, especially as B. had been the means of restoring the collections of his colleague Labillardière [See *B.L.* p. 514] ; he now begs B. to render similar assistance to himself. [*French*] [Note by B., " I wrote on the Rect. of this Letter to Capt. George of the Transport Office to obtain the liberation of M. Deschamps, on the plea of his being a non combatant which he immediately obtained from the Admiralty in consequence of which orders for his Release were forwarded to Portsmouth."]

B.M. Add. MS. 52281. 69–70.

4. St. Omer. 1803 June 25. Informs B. that he has rejoined his family at St. Omer and expresses his and their thanks to B. for his help in extricating him from his unfortunate situation ; Broussonet has left for Paris and sends his respects to B. [*French*].

B.M. Add. MS. 52281. 41*vo*–41.

5. St. Omer. 1803 July 5. He feels anxious about his property for which he has long been waiting; as communication from Dover has not been interrupted, he fears his goods have been seized by the Customs officers at Dover ; this delay is all the more disquieting as all his papers are there and he cannot go to Paris without seeing them ; as he fears he may be compromised if opposition were made by the [British] Government, he once more begs B.'s intervention with the Ministry to recover his effects. [*French*]. [On the back is a note from PIGAULT-MAUBAILLARCQ ; see *infra*, and *B.L.* p. 671.]

B.M. Add. MS. 52281. 64.

6. St. Omer. 1803 July 26. He has already written twice to thank B. for his valuable aid and to inform him that his property has not yet arrived ; begs pardon for his importunity, but fears his former letters have not reached B. [*French*]

B.M. Add. MS. 52281. 52.

7. [Soho Square. 1803. Aug. 18.* He has twice written to explain why D.'s trunks have not yet been received, and fears his letters have miscarried ; the last of the trunks have only just come, having been carried away by some French gentlemen. [See *supra*, COLE, W. No. 9] ; hopes all his property has now been recovered, but he cannot answer for that owing to interference by the French ; nearly a month ago orders were given to the agent of M. Pigault-Maubaillarcq [*q.v.*] to lose no opportunity of forwarding them to that gentleman ; no ship has sailed to France, and it is impossible to send goods by pacquet, as they are never allowed to enter Calais harbour ; regrets the disappointment, as the English Government has ordered every facility to be given so that all the collections may be restored. [Note by B. " Augt. 18 Learning from Mr. Newland's letter annexd that this letter would not pass I have omitted to send it." See *infra* NEWLAND, Isaac, No. 2].

B.M. Add. MS. 52281. 53.

8. Paris. 1803 Sept. 21. [Received Dec. 3]. Acknowledges B.'s letter of 25 July, informing him that he holds all his possessions and will forward them on the first opportunity ; as it was hoped to send them by M. Pigault [—Maubaillarcq.] (*q.v.*) at Calais, this method must fail as communication there is interrupted, and it would be better to send them to Morlaix,

to M. Forestier of the Bureaux de La Marine, as nothing would then be opened by the Customs officers ; in the list of the collection sent, there is no mention of 6 wooden boxes containing dried plants ; he fears these have been sent to W. Cole, to whom he has written ; these cases contain the most valuable of all the plants collected in Java ; Broussonet is in Paris about to leave for Montpellier. [*French*].
B. M.Add. MS. 52281. 57–58.

9. Paris. 1803 Dec. 28. [Received Jan 28, 1804]. Renews his thanks to B. for the great kindnesses rendered and for the assurance that on the first opportunity his property will be restored to him ; asks that the cases may be sent to M. Forestier Chef de division de la Marine at Morlaix or to his own address at St. Omer ; Broussonet and his family are at Montpellier, he has little or nothing to communicate as to Natural History, as everyone is occupied in making new systems or in describing old plants under new names ; Dr. Jussieu is about to issue his *Species Plantarum* on which he has long been working ; the Chevalier [Charles Pierre Claret, Comte de] Fleurieu has written the Voyage of D'Entrecasteaux, which is being printed at the expense of Government. [*French*].
B.M. Add. MS. 52281. 55–56.

10. St. Omer. 1814 June 14. Refers to information in his last letters that he was in London at the same time as Broussonet, and hopes B. will remember a naturalist arrived from Java and whose collections were detained by the Custom House at Portsmouth ; [Timothy] Topping (*q.v.*) who brings this letter has undertaken to obtain from B. the information necessary to recover the collections from the person with whom they were deposited in London ; it is possible that they may have been returned to France long ago, in which case he will endeavour to recover them. [*French*].
B.M. Add. MS. 52281. 66.

DOUCE, Francis, F.S.A. (1757–1834). Antiquary. (See First Supplt. p. 47).

39. Soho Square. 1815 Jan. 1.* Returns thanks for books lent and asks for the loan of Vol. iii of Rymer's *Fœdera.* [Fellows No. 18].
Bodleian. *MS. Douce* d. 22. 185.

DRYDEN, Frances, née HOWELL (d. 1828) Widow of Sir Gregory Dryden, 3rd Bart.

1. Revesby Abbey. 1807 Oct. 20.* Assures her that he has confidence in [John] Linton, [*B.L.* p. 545] and that he will watch over the interests

of Lady Dryden and her son ; asks if she has an agent in London with whom he can communicate ; the Clergy are averse to accepting one ninth of the Common Lands in lieu of their tithes and to giving up a portion of their advantages for the purpose of erecting and endowing chapels ; he hopes that after consultation with the parishes concerned, the bill will be passed at the next session of Parliament.

Northampton Records Office.

This relates to an Act for inclosing the lands in the East and West Fens in Lincolnshire. Lady Dryden, though resident at Canons Ashby, Northamptonshire, was a landowner in the area affected by the Act. After long negotiations, the Act was passed, including the clauses to which the Clergy had objected, 50 Geo. III, c. 129, and received the Royal Assent, 24 May. 1810.

DUNDAS, Henry, 1st Viscount Melville (1742–1811) Statesman. (See *B.L.* p. 283).

6. Somerset Place. 1791 Oct. 6. Encloses a letter from Sir John Sinclair (*q.v.*) about a Merino Ram for the Society for the Improvement of British Wool ; he had understood that two Rams were to be sent, but supposes the season is too far advanced to send the second. [See SINCLAIR, Sir John, *infra*, Nos. 19, 20].

B.M. Add. MS. 52281. 10.

7. Revesby Abbey. 1791 Oct. 12.* H.M. The King certainly destined two Rams for the Society ; the second will be sent to their order.

B.M. Add. MS. 52281. 10*vo.*

DUNDAS, Thomas, 1st Baron, F.R.S. (1741–1820) Agriculturist. (*B.L.* p. 284).

5. Carlton House. 1811 Feb. 19. Informs B. that on his recommendation to the Prince Regent, [John] Pond will be appointed Astronomer Royal ; he understands that the Home Secretary is the official channel to give effect to this.

B.M. Add. MS. 52281. 100.

6. [Soho Square. 1811] Feb. 19.* Acknowledges the above letter and notes that H.R.H. is disposed to the appointment of John Pound and that the Home Secretary is the proper person to make the appointment ; asks if it would be proper for him (B.) to take any step in the matter at present. [This apparently was not sent but the following letter substituted].

B.M. Add. MS. 52281. 100 *vo.*

7. Soho Square. 1811 Feb. 20.* Acknowledges his letter of the 19th and requests him to convey to H.R.H. his gratitude and to assure him that

his (B.'s) recommendation was made in the knowledge that Pond's qualifications are superior to those of his competitors.
B.M. Add. MS. 52281. 101.

FITZROY, Augustus Henry, 3rd Duke of Grafton. (1735–1811).

2. Stony Stratford. 1791 Aug. 23. Enquires whether the Spanish Ram presented to him by the King is one of those imported in 1790, or a lamb bred therefrom ; if, the latter, asks its age and by what dam.
B.M. Add. MS. 52281. 8.

3 [Soho Square]. 1791 Aug. 25.* Replies that the Ram is a real Merino, imported by H.M. in 1790.
B.M. Add. MS. 52281. 9.

FORSTER, Edward, F.R.S. (1765–1849). Banker and Botanist.

1. Soho Square. 1804 May 26.* Solicits F.'s vote in favour of [Henry James] Cholmeley who wishes to be a candidate for the position of Assistant Physician to Guy's Hospital should a vacancy occur ; he (B.) would not venture to recommend him were he not assured of his merits and qualifications.
Bodleian. *MS. Eng. Letters* c. 200. 64.

Henry James Cholmeley, (1778–1837) was the son of a Lincolnshire friend of B., Montague Cholmeley of Easton, whose wife was Sarah, daughter of another Lincolnshire friend, Humphrey Sibthorp, Professor of Botany at Oxford. Dr. H. S. Cholmeley was of Christ Church, Oxford ; M.A. 1803 ; M.D. 1807 ; F.R.C.P., 1811. He was appointed Physician to Guy's Hospital in 1811, a post which he held until his death.

Edward Forster, Banker of Gracechurch Street, London, was a well-known botanist and a Governor of Guy's Hospital.

GRAFTON, Duke of,—*See* FITZROY, Augustus Henry.

GREVILLE, Robert Fulke, F.R.S. (1751–1824) Equerry to George III. (See *B.L.* 372 and 903).

30. Gt. Cumberland Street. 1809 July 12. Informs B. that the Prerogative Court has made a decree appointing him sole administrator of the effects of his brother [The Hon. Charles Francis Greville. See *B.L.* p. 370] ; describes the opposition of Lord Warwick, [George, 2nd Earl, elder brother of Robert Fulke Greville] and others ; he will request B., as his bondsman, to execute the necessary deed.
B.M. Add. MS. 52281. 95–96.

HARRISON, Edward (1763?–1836) Medical Practitioner. (*B.L.* p. 398).

2. Soho Square. 1804 Dec. 31.* Returns thanks for copies of the correspondence between the Rev. Edward Walls [*q.v. B.L.* p. 853] and himself (H.), detailing his friendly attempts to effect a reconciliation between Walls and B. ; in view of the implacability of Walls and the foolish lucubrations he has seen fit to publish, he (B.) considers them a "*telum imbelle et sine ictu,* like all the rest shot out of his Fool's Quiver" ; if Walls wishes to try the case at law, he will clearly be nonsuited ; expresses his thanks for the honour conferred upon him by the Benevolent Medical Society ; asks if H. keeps a rain-gauge, and if so, requests him to send his readings to [John] Blanchard of Nottingham. [*q.v. B.L.* p. 104].

B.M. Add. MS. 52281. 92.

Full copies of the letters of Harrison and Walls are ff73–91 *vo.* Walls had printed a bitter attack upon B in Nov. 1803, (See *B.L.* p. 854, No. 10) add Harrison, as a neighbour of both parties, made a friendly attempt at reconciliation. B treated Walls' attack with silent contempt, and Walls remained bitter and implacible.

HARRISON, Sir George (d. 1841). Assistant Secretary to the Treasury. (See *B.L.* p. 398).

4. Treasury Chambers 1811 Feb. 20. Informs B. that he has seen Perceval who desires him to say that B. need trouble himself no further about the appointment of the Astronomer Royal as the matter is now all settled. [See PERCEVAL, Spencer, No. 2, and DUNDAS, Lord Thomas, Nos. 5, 6].

B.M. Add. MS. 52281. 104.

JENNER, Edward, F.R.S. (1749–1823) Physician and Naturalist. (*B.L.* p. 474).

2. Berkeley. 1789 [end of June]. Describes experiments made in mating a male fox with a female terrier with a view to ascertaining if such a cross would be fertile, but it failed ; describes experiments using serum of human blood as a manure for grass, and experiments on mustard seed set in layers of wool moistened with (1) water, (2) serum, (3) coagulated blood ; the seeds sprouted but soon withered, but when trial was repeated with one part of serum and two parts of water, the experiment was successful ; describes further experiments with growing plants and trees ; he has heard from [Sir Charles] Blagden that his letter to John Hunter on the cuckoo is to be published in *Philosophical Transactions.*

Baron[1], i. 73–77

[1] John Baron, *Life of Edward Jenner*, 2 vols. London, 1838.

3. Soho Square 1787 July 7.* He is much interested in the experiment on fox × dog, and the effects of manure on plants ; in consequence of J.'s discovery that the young cuckoo and not the foster-parents ejects the young birds of the host from the nest, requests that the Council of the Royal Society may be allowed to alter J.'s paper accordingly, but they will be glad to print it later ; John Hunter has sent an excellent paper on Whales which will soon be printed.

Baron, i. 77–78.

4. Soho Square. 1811. Dec. 14.* Sends J. notice of his election to the Institut de France in the vacancy caused by the death of Dr. Maskelyne, and congratulates him on his admission by those who" are as little satisfied with the barbarous mode of warfare adopted by their Chief as we Englishmen can be ".

Baron, ii. 167.

KNATCHBULL, Frances Anne. (d. 1843).

1. Hatch. 1793 Aug. 11. [To Lady Banks]. Describes a prescription and treatment for gall-stones which Lady B. desired to have ; she hopes it is not required for any member of the family.

B.M. Add. MS. 52281. 20.

KRAMER, Johann Hermann. (1776–1838). Hydraulic Engineer

1. Bremen. 1816 July 29. Informs B. that he has made " a most important inorganic discovery ", (eine der wichtigsten unorgenischen Erfindungen) ; he has sent an account of this in a sealed packet to the Gesellschaft d. Wissenschaft : the nature of the discovery is not stated in the letter, but he considers it to be not only of scientific but also of economic value and asks B. to assist him to finance it and to secure his rights as discoverer for the benefit of his family. [*German*].

B.M. Add. MS. 52281. 138–139.

As this letter was addressed to B., I presumed that by the " Society of Science " The Royal Society is meant. I am informed that there is no reference to the matter in the Council Minutes or other records of the R.S., and it is therefore probable that one of the German Academies is referred to. The letter is written in fulsome and flattering terms.

The writer was an engineer in Norway, then a captain in the Danish army, from which he retired and became a Prussian civil servant with the title of Ober-revisionsrath.

LOUREIRO, João. (1710—1791). (See *B.L.* p. 556).

9. Soho Square. 1780 May 12.* As he has received many advantages from L.'s scientific labours, he hopes he may be induced to visit

England ; their mutual friend Perry, who brought L.'s latest descriptions of Cochin China plants, reports that such a visit is to be hoped for.

Dawson, M.S. 46. 105 *vo.*

10. Soho Square. 1782 Dec. 22.* Returns by [Francis] Masson L.'s manuscript work entitled *Nova Genera Plantarum* which he had bound into a volume, and on which his (B.'s) name has been inadvertently stamped by his Librarian ; owing to the difficulties under which L. had compiled it through lack of books to which to refer, it contains errors that need correction ; if suitably revised it would be a useful and valuable work; hopes that in spite of the infirmities of age, L. will be induced to visit England where the resources of B.'s library and the Royal Society will be at his service.

Dawson, MS. 46. 106.

As Padre João Loureiro, an eminent Portuguese botanist who had travelled in the Far East, had sent B. the manuscript of his work on Cochin China plants to be published in England [*B.L.* No. 1], he being then in Canton, B. returned it to him by Francis Masson, [*q.v. B.L.* p. 590], who was about to travel to Spain and Portugal. In B.'s opinion the work required extensive correction and revision before it would be in a fit state for publication. Loureiro had been in Canton from 1779 to 1781 and had returned to Lisbon when B.'s second letter was written. The work was eventually published in two volumes in 1790 with the title *Flora Cochinchinensis.* The mutual friend Perry has not been identified. He was probably an official in the East India Company's establishment at Canton. The originals of both these letters are in the library of the Muséum National d'Histoire Naturelle, Paris.

MACLEAN, William. Inspector of Customs, H.E.I. Co. (*B.L.* p. 565).

3. E.I. Office Custom House 1803 June 28. Reports that two trunks belonging to Deschamps have not arrived at the E.I. Co. Baggage Warehouse ; he supposes some mistake has arisen owing to the officers at Portsmouth having detained them through the ship being Prize and not condemned ; suggests communicating with Portsmouth ; encloses statement of charges on B.'s Teneriffe wine and other articles sent, not chargeable to the Royal Gardens at Kew. [See *supra*, COLE, William and DESCHAMPS, Louis Auguste].

B.M. Add. MS. 52281. 37–37 *vo.*

4. E.I. Office Custom House. 1803 July 16. Reports that he has found the two missing trunks of Deschamps ; encloses copy of a letter from the Collector of Customs at Portsmouth explaining that by an error of the Warehouse Keeper the trunks were sent in the name of Quillon as from Admiral Chapman ; reports that the war-

rant from the Treasury authorizes delivery of the trunks (which contain wearing apparel) and also the collections and papers at Portsmouth ; requests B. to order that the remainder of the packages at Portsmouth be sent to the E.I. Co. Baggage Warehouse ; meanwhile the two trunks will be sent to Soho Square.

B.M. Add. MS. 52281. 43–43 *vo.*

5. E.I. Office Custom House. 1803 July 20. He has made application for sending the packages of Deschamps from Portsmouth.

B.M. Add. MS. 52281. 46.

6. E.I. Office Custom House. 1803 July 27. Reports the arrival of 4 cases and 2 chests belonging to Deschamps ; he understands that communication by neutral ships has been stopped and nothing can be sent direct to Calais at present ; meanwhile he will have an inventory made so that no delay may occur when an opportunity offers of sending the goods to Deschamps.

B.M. Add. MS. 52281. 49.

NEPEAN, Sir Evan, Bart., F.R.S. (1751–1822) Under Secretary of State. (*B.L.* p. 633).

14. Whitehall. 1785 Sept. 3. Informs B. that the Commodore has received his orders and will probaby sail in a few days ; the gardener should call at the Admiralty to receive his official instructions in accordance with the draft furnished by B., before he goes to Portsmouth ; Mas[s]on has gone to the City to arrange joining the mess with some of the Mates of the *Talbot* ; expects the letters of recommendation to the Governor of the Cape of Good Hope by van Lynden. [Dutch Ambassador].

B.M. (*N.H.*)†

This letter relates to the journey of Francis Masson to the Cape, (*B.L.* p. 590, No. 4) and precedes NEPEAN, No. 1 (*B.L.* p. 633).

NEWLAND, Isaac. (*B.L.* p. 635).

2. York Place [1793 Aug. 18] Informs B. that there is no other method of sending letters safely to France except through one of the neutral ambassadors, with all of whom B. is acquainted ; he thinks that an application by B. himself to Count Woronzow would be effective. [Count Simon Woronzow was Russian Ambassador in England. See *supra*, DESCHAMPS, L. A. No. 7].

B.M. Add. MS. 52281. 54.

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† Inserted in a copy of Edward Smith's *Life of Banks*. (See *supra*, note to ASTLE, Thomas, No. 1).

PERCEVAL, Spencer (1762–1812) Statesman. (B.L. p. 665).

2. Downing Street. 1811 Feb. 10. Assures B. that he will not recommend for appoinment as Astronomer Royal any person who has not B.'s approbation ; he has been solicited on behalf of another candidate whom he has informed accordingly. [See *supra,* HARRISON, Sir George, No. 4].
B.M. Add. MS. 52281. 102.

PERCY, Thomas, D.D. (1729–1811) Bishop of Dromore (See *B.L.* p. 666).

5. Soho Square. 1783 Nov. 11.* Having read in the newspapers of the discovery of the skeleton of a Moose deer of extraordinary size near Dromore, he informs P. that although the horns of that animal have been seen in England, there is no specimen of it except a defective cranium : he requests that the skeleton may be lodged in the B.M. where it can be examined by naturalists with a view to ascertaining whether the species is extinct or if it still exists in any part of the world. [Precedes *B.L.* No. 1].
Bodleian. *MS. Eng. Misc.* b. 38. 133–4.

6. Soho Square. 1783 Dec. 30.* Returns thanks for P.'s letter describing the bones of the deer [*B.L.* No. 1] ; he does not " covet his neighbour's goods " but repeats his request that the specimen be made available for scientific examination ; states his views on the extinction of animals and sends an engraving of the bones of a horse to help in identifying the corresponding bones of the deer. [Follows *B.L.* No. 1].
Bodleian. *MS. Eng. Misc.* b. 38 137–8.

7. Soho Square. 1784 Feb. 7.* Returns thanks for P.'s letter enclosing a drawing of the deer's horns, [*B.L.* No. 2] ; considers the Moose of America to be the same animal as the Elk of northern Europe, and that Josseline (*sic*) gives a foolish reason for the Moose being different from the Elk, [John Josselyn, *New England's Rarities discovered,* 1672] ; he alters his opinion in his New England Voyages, [*Account of Two Voyages to New England,* 1674, p. 88] where he describes an animal under the name of Moose or Elk killed in Finland ; B. considers both accounts to be fabulous; states the differences in the antlers of the Dromore deer and the Irish Elk ; Pennant is of opinion that the Moose and the Elk are the same animal ; the Anatomy of the animals in the Museum of the King of France is published both in French and English ; he has all the versions in his library, and not

one of them gives the skeleton of a deer though a young Elk is depicted ; thanks F. for the reference to the Camelopardalis [in Fynes Moryson's *Travels*, 1617], there is a stuffed skin in the B.M. and some bones, and he hopes the living animal may be found at the Cape of Good Hope.

Bodleian. *MS. Eng. Misc.* b. 38. 139–140.

PHIPPS, Constantine John, 2nd Baron Mulgrave, F.R.S. (1744–1792) Naval Officer. (*B.L.* p669).

4. *Race Horse*, off Spitzbergen. [1773] July 4. Although in 79° 30′ he has seen no ice, and has no fire in his cabin ; he has collected various Natural History specimens for B., including a new *Larus*. [This bird is a Kittiwake, *Rissa tridactyla. L.* ; the letter is published in *Journ. Soc. Bibl. Nat. Hist.*, Vol. 4. pt. 4, (1964), p. 208].

B.M. (*N.H.*)†

PIGAULT-MOBAILLARCQ: (*B.L.* p. 671).

2. Calais. 1803 July 7. [Written on the back of DESCHAMPS, L. A., No. 5]. Corrects Deschamps's letter, left open, to say that the quickest way to obtain his effects and those of Broussonet would be to send them to [George] Christopher of the Custom House, London, with the request to ship them directly on the first neutral ship for Calais, as it is doubtful that they can come from Dover, and Christopher will do what is necessary.

B.M. Add. MS. 52281. 65.

RAMPASSE, Joseph. (fl. 1805–1816) Geologist. (See *B.L.* p. 693, and First Supplement, p. 60).

4 Florence. 1816 Oct. 29. After a flattering introduction, he states that he has written four times since receiving his letter of 25 Jan. [Supp. No. 2, precedes *B.L.* p. 693, No. 1], on 7 May, 7 June and 13 Sept. [*B.L.* No. 2] ; his unfortunate situation moved him to approach the authorities of the B.M. [in order to sell them his collections] ; his present state is even worse as he has had to incur commitments for his subsistence which have brought him before the Civil Courts ; he has temporized with them in the hope of a favourable decision [by the B.M.] but he cannot hold out any longer without the kindly intervention of B. and makes a poignant appeal ; in a P.S. he states that a remark by one of B.'s countrymen has given him fears as to B.'s health ; he has since heard a

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† Inserted in a copy of Edward Smith's *Life of Banks*. See above, note to ASTLE, Thomas, No. 1.

satisfactory report from [August Friedrich] Schweigger, a German Professor of Zoology ; from his meeting with Schweigger he is more than ever convinced that his letters have not been received. [*French*].

B.M. Add. MS. 52281. 140.

5. Florence. 1816 Nov. 23. Acknowledges B.'s letter of 11 Oct. which arrived 9 Nov., the first he has had since that of 25 Jan. [*B.L.* No. 1], and which crossed his own of 29 Oct. [No. 4] ; the disappointment conveyed by this last letter is very painful that the Trustees of the B.M. have declined his offer although the previous letter gave him grounds for hope ; he repeats that the hopes that B.'s friend M. Dashewoot [?Dashwood] had given him are nullified by B.'s letter ; he considers that the candour and integrity in which he conducted his negotiations with the Trustees should entitle him to assistance either by B. personally or by the Trustees in view of his distressing circumstances ; asks B. to appoint some trusty person to arbitrate on the value of the 3 cases of minerals he sent ; states that these minerals, other than the porphyry, orbicular granite and Corsican sand, were specially obtained for him in Tuscany as specimens not to be found in any other collection. [*French*].

B.M. Add. MS. 52281. 142.

It is not known how the affair of the unfortunate Rampasse terminated as the correspondence is incomplete : such letters as have survived come from three different sources. The minerals he sent for purchase by the B.M., and which the Trustees declined, were presumably sent back to him, unless B. had them sold in London for Rampasse's benefit.

REEVES, John (1752?—1829) King's Printer. (*B.L.* p. 695).

2. Soho Square. 1814 Dec. 7.*. *Incipit* " In answer to your Question with which your Pamphlet is headed I beg leave to write NO ; " against R.'s contention that the Americans born before the Independence, by the laws of England are not aliens, B. affirms that every American who levied war against his Sovereign is guilty of High Treason ; also that the declaration of Independence in Parliament is in effect a declaration that the Americans are no longer subjects of Great Britain ; discusses the legal status of *ante nati* and *post nati* ; a person declared to be independent cannot be *ad fidem regis* of the country of which he is independent.

B.M. Add. MS. 52281. 135 *vo*–136 *vo*

In 1814, Reeves published a pamphlet purporting to prove that Americans born before the Independence are by the laws of England not aliens. In 1816, he published another of the same purport. Banks emphatically disagreed with this opinion, and drew up a statement headed " An Attempt to refute the Argument of the arrogant Barrister who has ventured to declare that all the World, himself alone excepted, were labouring under the disabilities of Vulgar Error." A copy of this document, not in B.'s handwriting, is preserved with the copy of the letter. B. has cancelled the last paragraph and added in his own hand the following : "The arguments concerning Ante and Post nati were not as I fancied them when I wrote the above at the occasion of Queen Annes union of the two kingdoms. They were on the uniting of the Two Kingdoms under James the first. The arguments therefore are sound as the ante nati could not be subjects of the English Crown unless admitted to that Privilege by Parliament.

" If Americans can in any sense be deemed Subjects of the British Crown all of them ante nati as well as Post nati must be endowd with the Privelege as the Common Law of England allows the children and grandchildren of British subjects wheresoever they may be born and does not make any distinction of Privelege or Duties between such subjects and those natural born." [*f.* 136 *vo*].

SARGENT, John. Official of the Treasury.

1. Soho Square. 1803 June 24*. Deschamps, who accompanied d'Entrecasteaux as Naturalist during his voyage in search of La Peyrouse and resided 12 years in Java, was captured on board *L'Union* on his return by H.M.S. *Jupiter*, Capt. Lossack ; application was made by B. for his release as a non-combatant which was immediately granted and he returned to his own country ; the Captors gave up his personal luggage and collections ; his clothes in two trunks are now in the E.I. Co.'s warehouse in London, his collections and papers are in charge of the Custom House at Portsmouth ; he requests that the Lords of the Treasury may empower him (B.) to receive these duty free, and he would then forward them to their owner in France by a neutral vessel ; this indulgence to men of Science would produce good consequences when the French and their ruler lay aside the passion that now influences them.

B.M. Add. MS. 52281. 48.

See, above, the letters of COLE, W. and DESCHAMPS, L. A.

SINCLAIR, Sir John, 1st Bart., F.R.S. (1754–1835) President of the Board of Agriculture. (See *B.L.* p. 755).

19 North Merchiston. 1791 Aug. 19. [to Henry Dundas, *q.v.*]. Encloses a letter from B. announcing that the King has allotted two Merino Rams to the Society for Improving British Wool ; describes the plans and activities of the Society ; encloses a memorandum as to how the Rams are to be conveyed to Edinburgh. [See DUNDAS, Henry, No. 6].

B.M. Add. MS. 52281, 5–6.

20. Leith [1791 Oct. 4]. [To Henry Dundas]. Notifies the arrival of a Ram; he understands that two were destined and hopes the mistake will be rectified.

B.M. Add. MS. 52281. 7.

21. Edinburgh. 1791 Oct. 22. Encloses letter from Henry Dundas and requests B., when he goes to Windsor, to endeavour to have the second Ram dispatched this season; describes the Society's holding of Merino sheep and crosses and encloses a specimen of the wool.

B.M. Add. MS. 52281. 11.

22. [Revesby Abbey 1971] Oct. 27.* Returns thanks for the specimen of wool; H.M. gave early orders for two Rams to be sent to the "Scotch Society" and Dundas was informed of the fact; the mistake was made by Ramsay Robinson, the Windosr shepherd, and as soon as it was discovered, Dundas was informed that a second Ram would be delivered to his order.

B.M. Add. MS. 52281. 11 *vo.*

SOMERVILLE, John Southey, 15th Baron Somerville. (1765–1819) President of the Board of Agriculture.

1. Soho Square. 1799 May 11.* Acknowledges Lord S.'s letter of May 6, recommending the formation of an Agricultural Society at Horncastle, which he has forwarded for the consideration of the gentlemen of that vicinity; as Lord S. and the Board have nominated him (B.) as a proper person to be the President of such society, he wishes to be informed in what other towns in Lincolnshire the Board has recommended the establishment of societies with the names of the proposed Presidents, as so much depends on the zeal of those who undertake such office. [Lord S.'s letter is a printed one, signed by him as President of the Board of Agriculture, with blanks for the insertion of the names of the towns and the proposed Presidents].

Rothamstead† ⟨1⟩

2. Sackville Street. 1799 May 20. [Third person]. Lord S. sends forms for B. to insert the names of such towns in which Agricultural Societies can be advantageously founded, and the names of persons recommended as President of each.

Rothamstead ⟨2⟩

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† Manuscripts in the library of the Rothamstead Experimental Station.

3. [Soho Square. 1799] May 21.* [Third person]. B. presents his compliments to Lord S. but as he doubts his ability to execute the task to his Lordship's satisfaction, he begs that the matter may be put into the hands of some person better able to perform it.

Rothamstead ⟨3⟩

For Lord Somerville's activities as an agriculturist, see H. B. Carter, *His Majestys' Spanish Flock* 1964, pp. 246ff.

TOPPING, Timothy.

1. Bermondsey [1815 Apr. 6] On his return from being a prisoner in France, he was requested to take charge of the enclosed letter [DESCHAMPS, L.A. No. 10] ; requests that B. will give him the information asked for, which he will communicate to Deschamps.

B.M. Add. MS. 52281. 67.

2. Soho Square 1815 Apr. 7.* In reply to his and Deschamps's letters, he has read the correspondence that passed between them in 1803 and finds that Deschamps wrote on 5 July and on the back of that letter was a note from Pigault-Mobaillarcq (*q.v.*) desiring Deschamps's baggage to be sent to Mr. Christopher at the Custom House, London, to be dispatched by him ; this was done and he had no doubt that the baggage was sent ; he heard no more of the matter until the receipt of Deschamps's letter, when he had search made at the Custom House, but without result.

B.M. Add. MS. 52281. 68.

YOUNG, Arthur, F.R.S. (1741–1820) Agriculturist. (See *B.L.* pp. 888 and 911).

22 Bradfield. [1791] Sept. 14. Asks if it would be proper to advertise in the *Annals* [*of Agriculture*] that the King having presented to the Editor a Merino Ram in order to multiply useful crosses, the Ram shall cover ewes at a charge of a guinea each ; if B. judges that it would be distasteful to H.M., he would not so advertise. [Note by B. " To answer for the opinions of very Great People is impossible but my own on the subject of Spanish Sheep is that H.M. gracious purpose in giving you a Merino Ram cannot be better answered than by your advertising him at a Guinea a Ewe." [The advertisement was duly printed, and a copy of it is appended, f. 134].

B.M. Add. MS. 52281. 132.

23. Sackville Street. [1798] May 31. Sends by order of the Board [of Agriculture] a communication by Ainsworth on Vegetables and requests B.'s opinion as to whether it merits publication or not. Endorsed "Not fit for Publication. J. B."

Rothamstead ⟨4⟩.

YOUNG, Thomas, M.D., F.R.S. (1773–1829) Physician and Physicist. (See *B.L.* p. 891).

5. Welbeck St. 1801 July 9. [To Count Rumford]. Accepts the offer made to him by the Managers of the Royal Institution, [to be Professor of Natural Philosophy, editor of the Journals and Keeper of the House] ; considers the reduced salary offered inadequate ; his new duties would much limit his opportunities for continuing his medical practice which he cannot bind himself to discontinue entirely ; considers that the issue of the Journals should be left to the discretion of the Professor and not necessarily to be weekly.

B.M. Add. MS. 52281, 30–31.

Count Rumford evidently sent this letter to B. for his information. Young was duly appointed but resigned the professorship in 1803. See *B.L.* p. 814, No. 47.

PSEUDONYMOUS LETTERS. (*B.L.* p. 895).

37. Stockholm. 1797 June 4. Signed " Antiquarius Botherarius ". Neatly and closely written, the letter fills 3 pages. The writing is much faded and is difficult to read. The narrative, a burlesque full of absurdities, reads like a modern Arabic popular story. The episode of the amulet in the form of a miniature crocodile, which, on the recitation of a magical formula, becomes a real crocodile, recalls that in an ancient Egyptian story in the Papyrus Westcar. (Maspero, *Popular Stories of Ancient Egypt*, 1915, p. 26).

B.M. Add. MS. 52281. 23–24.

38. [1798] —. A satirical letter, undated, but marked by B. as received 19 Dec. 1798. It is addressed " Sir Joseph Bankis Knt., Small Beer Green, near Hounslow ", and signed " Pigdum Funnibus ", and is insulting to Lady Banks.

B.M. Add. MS. 52281. 25.

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EGGS OF THE GREAT AUK

P. M. L. & J. W. TOMKINSON

BULLETIN OF
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Pp 95–128 ; *Plates* 1-75

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THE BRITISH MUSEUM (NATURAL HISTORY)

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EGGS OF THE GREAT AUK

By P. M. L. & J. W. TOMKINSON

In memory of Gerald Tomkinson, 1876–1959

PREFACE

When Mr. Gerald Tomkinson died, in 1959, he left his collection of birds' eggs to his son Mr. J. W. Tomkinson. The collection included an egg of the Great Auk and was supplemented by a printed list, prepared by Edward Bidwell, of all the Great Auk eggs known to exist in 1892, with annotated additions up to 1900, together with a set of photographs of all but two of the eggs. Mrs. P. M. L. Tomkinson and her husband decided to bring Bidwell's list of eggs and owners up to date and were encouraged to do so by Mr. J. D. Macdonald, officer in charge of the Bird Section of this Department. Early in the compilation of the available information it became clear that it would be desirable to record the history of each egg and so from a simple list the project developed into the present publication which includes a photograph of each egg and a summary of its provenance and changes of ownership to the present time.

The 75 eggs, together with some skins and skeletons are all that now remain of the Great Auk. The extinction of this species is usually attributed to human agency, because over a long period, these flightless birds were driven into stone pens, slaughtered and salted down in the holds of ships for food and oil. There is evidence, however, that the distribution of the Great Auk was shrinking long before man came on the scene and that its course was towards extinction because of adverse biological factors. It is because of the common, inherent propensity of man to collect that these few relics of an extinct species survive today.

J. P. Harding
Keeper of Zoology

INTRODUCTION

There is no authentic record of the existence of the Great Auk after 1844. Its disappearance put a scarcity value on its relics and the prices at which the few remaining eggs changed hands increased until at the turn of the century they usually reached over three hundred pounds. Although that means about as many thousands by present monetary values the price does not seem to have increased much beyond that actual figure judging by the few recent sales where the purchase price has been made known. Great Auk eggs became collectors' pieces and no cabinet of any pretentions was complete without one, if not an original then a copy. One of the most productive and expert copyists was John Hancock of Newcastle whose models of several of the eggs fetched anything up to five pounds at auction sales.

The following records show that the eggs did not rise in value until long after the bird became extinct. For a number of years after 1844 eggs are known to have been given away or to have changed hands for a few shillings or francs: for example, Hewitson (1856) refers to the £5 paid by Wilmot (see No. 9) as "an extravagant price". There was, therefore, no great enticement of financial gain in collecting eggs during the last few decades of the birds existence, by which time its fate must have been sealed; its population must have dwindled to a point beyond all reasonable hope of recovery.

The basis of these notes was provided, of course, by Bidwell's photographs, with the corresponding list, which would permit complete identification of each egg. As Bidwell's list was the starting point, we decided to keep his numbering of the eggs, tracing each one to its present owner, keeping any untraced egg in its proper order as long as no certain proof of its being destroyed was obtained, and adding any new discovery to the end. This might, at first glance, give a false idea of the number of eggs, but we thought it best not to start a new numbering as many owners are aware of Bidwell's list and the number of their egg or eggs in it.

Bidwell's numbers did not correspond with those given by Symington Grieve to the eggs known to him when he published his book "The Great Auk or Garefowl" in 1885. Thomas Parkin also numbered the eggs differently in his "The Great Auk: A Record of Sales of the Birds and Eggs of the Great Auk in Great Britain", 1912. The relationship of these systems of numbering is indicated in Appendix D.

Bidwell recorded 71 eggs and obtained photographs of 69 of them. We have been fortunate in being able to get photographs of the other two, by kind permission of The Academy of Natural Sciences, Philadelphia and the Smithsonian Institution, Washington, D.C. The owners of four additional eggs have also supplied us with photographs.

Of Bidwell's 71 eggs the present location of three has not been traced: they are Nos. 38, 59, 68. As there is no proof that they have ceased to exist we have included what information we have about them in their proper sequence. We hope that by bringing attention to them in this way information about their subsequent history will come to light. It is possible that some might be owned by Captain Vivian Hewitt of Bryn Aber, Anglesey, North Wales, who has not been able to give us full information on the eggs in his collection.*

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*Captain Vivian Hewitt died on 26th July, 1965. It is not known what is to become of this collection of Great Auk eggs.

Of the four eggs we have added to our list No. 72 was mentioned by Thomas Parkin in 1912, and No. 73 was added by Bidwell in MS in 1914 to his own copy of his printed list. Nos. 74 and 75 were unknown to previous recorders and are here listed for the first time. The former is located in the city Museum at Bristol and the latter in the American Museum of Natural History, New York.

Except in a few cases the origin of the eggs is not known. It is probable that many of them were taken in eastern Canada during the period when vessels from Europe visited Newfoundland and other places on that coast to victual with easily available fresh meat and eggs and barrels of salted birds. No doubt sailors brought home a few eggs as souvenirs, like Ostrich and Emu eggs at a later date were brought or sent home by early travellers and settlers in South Africa and Australia. French ships were frequent visitors to these waters and a number of eggs can be traced to French sources. Some British ports, like Poole in Dorset, had trading connections with Newfoundland while the Great Auk was still plentiful. Other eggs, especially those handled by German dealers, probably originated in Iceland.

One fact which has come out clearly in this study is the reduction of Great Auk eggs in private collections (*see* Appendix A). As these collections break up, with the passing of time, most of the eggs have found their way to various museums in Europe and the United States of America. There is one exception. The largest number, at least eleven, is owned by Captain Hewitt. He acquired four, two directly and two indirectly through Jourdain, from another large private collection, that of G. Dawson Rowley whose six specimens were auctioned in 1934. Of the other two, one is still in private hands and the other has been lost trace of. In the latter half of the nineteenth century Robert Champley owned nine eggs of which only one is now in private hands. One of Lord Lilford's five eggs is now in the British Museum; the other four went to Alfred Newton who gave them, along with three other eggs in his possession, to Cambridge University Museum. At the end of last century the Baron d'Hamonville owned four eggs, two of which are still owned privately, one by Captain Hewitt and one by us: the other two went into the great Thayer collection whose ten specimens were donated to the Harvard Museum of Comparative Zoology in 1931–32. This trend of events is only to be expected and will have the advantage of bringing more permanency to these records, as the frequent changes of ownership in the past occurred mostly between private individuals. It should also ensure the best conditions for the safe keeping of these remains of this unfortunate bird.

It would not be possible to name here all those who have so kindly helped in this research, answering endless enquiries, photographing their eggs for comparison, looking up records and data with great generosity. We are indebted to all the Museums and private owners who in this way, have made the work possible. Finally, we must thank Mr. Macdonald for his support and encouragement; and Major W. M. Congreve who put his knowledge and his memories of many past owners at our complete disposal.

EGG No. 1 (Pl. 1)

Grieve's No. 31 or 32; Parkin's No. XXV

LOCATION. British Museum (Natural History), London.

REMARKS. Badly cracked and faded because of being glued to a board and exhibited in the public gallery at Bloomsbury for fifty years.

HISTORY. This specimen and No. 2 were first recorded in the possession of William Bullock, a Liverpool jeweller and goldsmith whose private collection of "natural and foreign curiosities" became famous Museums in both Liverpool and London in the early part of last century. The contents of the Museum were finally sold by auction in 1819. This egg was packed in a box along with a skin of the Great Auk from Papa Westray, Orkney. There is nothing to show that both came from that locality, but it is recorded that Bullock visited the Orkneys in 1813, that he tried without success to get specimens of the Great Auk, which had become rather uncommon by that time, and that some were sent on to him soon after his visit. Egg and skin were auctioned on 16th May, 1819, and bought on behalf of the Trustees of the British Museum by Dr. Leach, Keeper of the Zoology Department, for £16 15s. 6d.

EGG No. 2 (Pl. 2)

Grieve's No. 31 or 32; Parkin's No. XXVI

LOCATION. British Museum (Natural History), London.

REMARKS. The number "139" is inscribed on the small end. Like No. 1 the egg is badly cracked and faded because of being glued to a board and exhibited in the Museum public gallery for many years.

HISTORY. As for No. 1. Originally in Bullock's collection. Bought by Dr. Leach on 3rd June, 1819 for either 12s. or 17s.

EGG No. 3 (Pl. 3)

Grieve's No. 23; Figured in colour by Grieve, *The Great Auk*, 1885, *108, no. 1*

LOCATION. Royal Scottish Museum, Edinburgh.

HISTORY. This egg and No. 4 were first recorded in the collection of Monsieur Dufresne of Paris. Dufresne was originally a dealer in natural history specimens and was also for some time Keeper of the Cabinet of Natural History belonging to the Empress Josephine. In 1815 he entered the Paris Museum as Assistant Keeper and it was while in that position that he sold this and No. 4, as part of an extensive collection, to some members of the Senatus of Edinburgh University in 1819. The collection was acquired by the Senatus as a body in 1855 and transferred by them to the Museum of Science and Art, now the Royal Scottish Museum.

EGG No. 4 (Pl. 4)

Grieve's No. 24; Figured in colour by Grieve, *The Great Auk*, 1885, *108, no. 2*

LOCATION. Royal Scottish Museum, Edinburgh.

HISTORY. As for No. 3.

EGG No. 5 (Pl. 5)

Grieve's No. 38; Parkin's No. IX. Figured by Wolley, *Ootheca Wolleyana*, 1905, *2; pl. 17*

Location. University Museum of Zoology, Cambridge.

Remarks. This egg and No. 6 had the word "Egal" or "Egale" written on them; and also the word "Pingouin" was once plainly visible on both.

History. The first certain record of both eggs is in the collection of a Mr. Moule who was President of the Post Office in Edinburgh from 1820 to 1840. Newton thought that these eggs may have been part of the Dufresne collection bought in 1818 (*see* No. 3) and being poor specimens may have been rejected. One half of Moule's collection, containing these two eggs, was bought by Mr. Cleghorn Murray. At a sale of miscellaneous property belonging to Mr. Murray, in Mr. Dowell's Auction Rooms, on 8th May, 1880, these eggs were bought by Mr. Robert Small, a dealer in natural history specimens for 32s. They were sold in Stevens' Rooms in the same year, 2nd July, and No. 5 was bought by Lord Lilford for £100. Before his death in 1896 Lord Lilford gave this egg, together with Nos. 6, 7 and 8, to Professor Alfred Newton of Cambridge University who presented them to the University Museum.

EGG No. 6 (Pl. 6)

Grieve's No. 39; Parkin's No. X. Figured by Wolley, *Ootheca Wolleyana*, 1905, *2; pl. 18*

Location. University Museum of Zoology, Cambridge.

History. Similar to No. 5, with which it was associated during the period of its certain history, both, because of their period of French ownership, probably originating in Newfoundland. Lord Lilford bought it for £107 2s. at the auction sale at Stevens' Rooms on 2nd July, 1880. Before his death in 1896 Lord Lilford gave it to Professor Alfred Newton at Cambridge who presented it to the University Museum.

EGG No. 7 (Pl. 7)

Grieve's No. 40. Figured by Wolley, *Ootheca Wolleyana*, 1905, **2**; *pl. 19*

Location. University Museum of Zoology, Cambridge.

Remarks. Bears the inscription: No. 61.

History. It is reported that this egg and No. 65 may have belonged to Levaillant who died in 1824, and who may have given them to Professor D. A. Chavannes who died about 1846. Chavannes collection lay in the museum at Lausanne and these eggs remained without notice until discovered about 1860, or possibly later (*see* Wolley, 1905, *2; 378*) by the curator Dr. Depierre; this fact was recorded by M. Victor Fatio in 1868. The London dealer G. A. Frank saw them there in 1881 or 1883 and came to an arrangement with the Curator, Dr. Larguier, to have this specimen (inadvertently the better one) in exchange for a gorilla skin and a fine skull and several bones of the Great Auk. Frank sold it to Lord Lilford for £110. Before his death in 1896 Lord Lilford presented it to Professor Alfred Newton of Cambridge who presented it to the University Museum.

EGG No. 8 (Pl. 8)

Figured by Wolley, *Ootheca Wolleyana*, 1905, **2**; *pl. 20*

Location. University Museum of Zoology, Cambridge.

History. This egg was originally in the possession of a Middlesex family by name of Way (*see* Grieve 1897: *242*). James Way who died in 1816 had some connection with the Newfoundland Fisheries. The egg was passed to his son James Henry Way whose sister Betty Stone Way inherited it and then gave it, in 1872, to Miss Eliza Hill, eldest daughter of Philip Hill, a farmer near Blandford, in whose house the egg was kept as an ornament on the mantlepiece. The family was unaware of its value. A clergyman, named Walker, saw it and advised him to have it identified at the British Museum. He was told by Mr. Bowdler Sharpe that it was an egg of the Great Auk and was put in touch with Lord Lilford to whom he sold it for £50 on 21st April, 1884. Before his death in 1896 Lord Lilford presented it to Professor Alfred Newton of Cambridge who transferred it to the University Museum.

EGG No. 9 (Pl. 9)

Grieve's No. 41; Figured by Hewitson, *Eggs of British Birds, 3rd ed.* 1856, **2**; *pl.* 129

Location. University Museum of Zoology, Cambridge.

History. First heard of when in the possession of Leadbeater, a London dealer in natural history specimens, who sold it in 1846 for £5 to a Mr. J. P. Wilmot who had a collection of natural history specimens. Wilmot died in 1863 and his collection was bequeathed to Mr. G. L. Russell, in whose memory it was presented by his widow to the University Museum, Cambridge, in 1888.

EGG No. 10 (Pl. 10)

Grieve's No. 48; Figured by Seebohm, *History of British Birds*, 1885, **3**; *pl. 40*

Location. University Museum of Zoology, Oxford.

History. First heard of when in the possession of Lady Wilson of Charlton House, Blackheath. She gave it to a relative, Sir Walter C. Trevelyan, who had it for over forty years. He bequeathed it to Oxford University Museum which acquired the egg at his death in 1879.

EGG No. 11 (Pl. 11)

Grieve's No. 33

Location. Private collection of Captain Vivian Hewitt of Anglesey, North Wales.

History. This egg was discovered in the Hunterian Museum of the Royal College of Surgeons in London, on 12th December, 1861, by Professor Alfred Newton of Cambridge University. It was one of ten Great Auk eggs in a box labelled "Penguin Eggs—Dr. Dick". It remained in the College Museum with two others, Nos. 12 and 13, until the three of them were sold to Captain Hewitt on 19th June, 1946, for £1000 through the dealer Rosenberg. Incidentally, the proceeds of this sale went to the restoration fund of the museum which had suffered severely during the bombing of London in 1941. The three eggs remained in the strong room of the Museum until 18th November, 1949. Seven of the original ten eggs had been sold soon after their discovery by Professor Newton. Through the agency of Professor Flower three eggs were disposed of to Robert Champley of Scarborough in 1864 in exchange for a collection of anatomical specimens which Champley had bought for £45. (*See* Nos. 24, 25, 26); and four were put up for auction at Stevens' Rooms on 11th July, 1865 (*see* Nos. 17, 28, 29, 37).

EGG No. 12 (Pl. 12)

Grieve's No. 34; Figured by Seebohm, *Eggs of British Birds*, 1896, *pl. 28*

Location. Private collection of Captain Vivian Hewitt.

History. As for No. 11.

EGG No. 13 (Pl. 13)

Grieve's No. 35; Figured by Seebohm, *Eggs of British Birds*, 1896, *pl. 27*

Location. Private collection of Captain Vivian Hewitt.

History. As for Nos. 11 and 12.

EGG No. 14 (Pl. 14)

Grieve's No. 30; Figured by Seebohm, *History of British Birds*, 1885, **3**; *pl. 41*

Location. City of Liverpool Museums.

Remarks. This egg is in perfect condition and one of the most beautiful existing.

History. According to Robert Champley this egg was in the 13th Earl of Derby's Museum. At his death in 1851, the egg, together with Derby's collection, was presented to the City of Liverpool. Although this Museum was severely damaged during the 1939-45 war, the specimen was unharmed.

EGG No. 15 (Pl. 15)

Grieve's No. 44; Figured by Hewitson, *Coloured Illustrations of the Eggs of British Birds, 2nd ed.*, 1846, *pl. 115*

Location. Hancock Museum, Newcastle-upon-Tyne.

Remarks. Hancock made a cast of this egg. It is also briefly described by Passler, *Journal fur Ornithologie*, 1860, p. 59.

History. Believed to have been taken on the Island of Eldey, Iceland, in the period 1830–39 (probably 1831) along with a skin of the Great Auk. This egg appeared first in the possession of an apothecary of Flensburgh called Mechlenburg from whom it was purchased, through the agency of a Mr. Sewell, by John Hancock in 1844 or 1845.

EGG No. 16 (Pl. 16)

Grieve's No. 56

Location. Natural History Museum, Scarborough.

History. First recorded when the dealer Gardner obtained this egg from a collection in Derbyshire which he refused to name. Mr. Alwin Bell bought it from Gardner, probably some years previous to 1867. Bell bequeathed it to the Scarborough Philosophical Society, who in turn donated it to the new Natural History Museum of Scarborough. In the Daily Telegraph of 29th January, 1906, it was reported that the egg was found lying on a chair broken. It was repaired and placed in greater security.

EGG No. 17 (Pl. 17)

Grieve's No. 68; Parkin's No. IV. Figured by Parkin, *The Great Auk*, 1911, *pl. 2*

Location. Museum of the Spalding Gentlemen's Society, Spalding.

Remarks. A very fine undamaged specimen.

History. This is one of ten eggs first recorded in the Hunterian Museum of the Royal College of Surgeons (*see* No. 11) and one of the four eggs sold by auction at Stevens' Rooms on 11th July, 1865. It was bought by the Rev. G. W. Braikenridge of Clevedon, Somerset, for £29. After his death in 1882 it became the property of his sister, who sold it on 18th May, 1884, to Mr. Edward Bidwell of Twickenham, in whose possession it remained for 27 years. Mr. Thomas Parkin of Hastings, bought it from Mr. Bidwell in April 1911. It came up for sale once more at Stevens' Rooms on 13th May, 1931, and was purchased by Mr. Ashley Kay Maples for £265, who made a gift of it to the Spalding Gentlemen's Society, of which he was the President for many years.

EGG No. 18 (Pl. 18)

Grieve's No. 57; Parkin's No. XXII. Figured by Thienemann, *Einhundert Tafeln colorirter Abbildungen von Vögeleiren*, 1845–54, *pl. 96*

Location. Castle Museum, Norwich.

History. Herr Fr. Schulze of Leipzig received this egg along with others from Iceland. He sold it in 1835 to Th. Schulze of Neuhaldensleben, along with some other birds' eggs for 7 thalers (then 1 guinea). In 1857 Herr G. H. Kunz of Leipzig bought it from him for 50 thalers (then £7 10s.). Kunz sold it to Mr. Robert Champley of Scarborough in July 1859 for £18. It was one of nine owned by Mr. Champley.

Some years after Robert Champley's death in 1895 it was acquired by Colonel H. G. Barclay of Colney Hall, near Norwich, for his collection. In 1936 Mr. Evelyn Barclay presented it to the Castle Museum, Norwich.

EGG No. 19 (Pl. 19)

Grieve's No. 58. Figured by F. W. J. Baedeker, *Die Eier der Europaeischen Voegel,* 1855–63, *pl. 70, no. 3* (*top*)

LOCATION. Zoologisches Forschungsinstitut and Museum Alexander Koenig, Bonn.

HISTORY. It is recorded with some certainty that Mechlenburg a dealer of Flensburg obtained this egg from Iceland together with a skin of the bird which is thought to have laid it. Robert Champley of Scarborough bought both from Mechlenburg in 1861 for £45. After Champley's death in 1895 his eggs remained in the possession of his daughter for several years. They were sold eventually and Professor Alexander Koenig of Bonn acquired this one. He died in 1940 and this egg together with the other two in his possession, Nos. 21 and 35, went to the Museum which bears his name.

EGG No. 20 (Pl. 20)

Grieve's No. 60

LOCATION. British Museum (Natural History), London.

HISTORY. It was found by Robert Champley of Scarborough in the Museum of Anatomy of the University of Pavia, Italy, covered with dirt and placed in a wooden cup to look like an acorn. It was part of a collection given 100 years previously by Professor Spallanzi, a lecturer at the University at that time. Champley bought it for 5 napoleons. After Champley's death in 1895 Lord Rothschild acquired it from Rutter, Champley's son-in-law, on 1st November, 1901. It was bequeathed by Lord Rothschild to the Trustees of the British Museum (Natural History) who received it in 1937.

EGG No. 21 (Pl. 21)

Grieve's No. 59

LOCATION. Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn.

HISTORY. In 1861 Robert Champley of Scarborough visited the French naturalist Parzudaki, in Paris and was told of an egg owned by the Abbe de la Motte who had obtained it some 40 years earlier from French whalers. Parzudaki bought it for him for £24. After Champley's death in 1895, Professor Alexander Koenig bought it from Rowland Ward, the London dealer. When Koenig died in 1940 this egg together with the other two in his possession, Nos. 19 and 35 went to the Museum which bears his name.

EGG No. 22 (Pl. 22)

Grieve's No. 61; Parkin's No. XXI

LOCATION. Private collection of Major Sir John Stirling, K.T., of Fairburn, Ross-shire, Scotland.

HISTORY. First recorded as one of two specimens (*see* No. 23) in the possession of Fairmaire, a dealer in zoological specimens in Paris. It was bought by Rowland Ward the London dealer who sold it to Robert Champley of Scarborough for £25 in 1864. Following Champley's death in 1895 it was put up for sale at Stevens' Rooms on 17th April 1902 and bought by William Stirling of Fairburn for £252. It then passed to his son, Sir John Stirling.

EGG No. 23 (Pl. 23)

Grieve's No. 62. Figured by Thayer, *Auk*, 1905, **22**; *pl. 14* (*lower*)*:* and by Dresser, *Eggs of the Birds of Europe*, 1910, *fig. 1*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

HISTORY. This is the second egg which was in the possession of Fairmaire the Paris dealer (*see* No. 22). Rowland Ward bought it from him and sold it to Robert Champley of Scarborough in 1864 for £30. In 1905 it was sold for £200 through Rowland Ward of London to Colonel J. E. Thayer of Lancaster, Mass., U.S.A., for his private Museum. It passed with the Thayer Collection to the Museum of Comparative Zoology, Harvard, in 1931–32.

EGG No. 24 (Pl. 24)

Grieve's No. 63. Figured by Thayer, *Auk*, 1905, **22**; *pl. 14* (*upper*)*:* and by Dresser, *Eggs of the Birds of Europe*, 1910, *fig. 2*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass. U.S.A.

HISTORY. One of the ten eggs found by Professor Alfred Newton of Cambridge in the Hunterian Museum of the Royal College of Surgeons, London in 1861 (*see* No. 11). Through the agency of Professor Flower of the College, Robert Champley of Scarborough acquired this egg in 1864 in exchange for anatomical specimens. In 1906 the egg was sold for £315 through Rowland Ward of London to Colonel J. E. Thayer of Lancaster, Mass., U.S.A. It passed with the Thayer Collection to the Museum of Comparative Zoology, Harvard, in 1931–32.

EGG No. 25 (Pl. 25)

Grieve's No. 64

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

HISTORY. Similar to No. 24.

EGG No. 26 (Pl. 26)

Grieve's No. 65. Figured in the *Annual Report of the Museum of Comparative Zoology,* 1906, *pl. 2*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

HISTORY. Similar to 24 and 25. This egg was bought in 1905 through Rowland Ward of London by Harvard University with part of the donation of 5,000 dollars given to them by Col. William Barbour of New York. Barbour was father of Dr. Thomas Barbour, director of the Museum of Comparative Zoology at that time.

EGG No. 27 (Pl. 27)

Grieve's No. 19

LOCATION. British Museum (Natural History), London.

HISTORY. Believed to be one of two eggs collected in Iceland as late as 1844 and taken to Copenhagen and to have been bought there by J. de Capel Wise about 1851. It came into the possession of Williams, a London dealer, who sold it to Canon Tristam in 1853 for £35. Philip Crowley of Croydon, Surrey, purchased the whole of the Tristam collection including this egg. Finally it reached the British Museum (Natural History) in 1937 with the Crowley bequest.

EGG No. 28 (Pl. 28)

Grieve's No. 67; Parkin's No. VI

LOCATION. Private collection of Captain Vivian Hewitt of Anglesey, North Wales.

HISTORY. One of the ten eggs of the Hunterian Museum of the Royal College of Surgeons discovered by Professor Alfred Newton of Cambridge in 1861 (*see* No. 11). One of four sold on behalf of the College at Stevens' Rooms, London, on 11th July, 1865, and bought by the Rev. Henry Burney of Woburn, Bedfordshire for £31 10s. At a later auction sale at Stevens' Rooms, it was sold to Mr. Leopold Field of Harlesden, Middlesex, on 13th December, 1887 for £168. Mr. Herbert Massey of Didsbury, Cheshire, through the agency of Marsden, acquired it on 4th September, 1891, for £220. It was finally bought by Captain Vivian Hewitt from the executors of Mr. Massey, about 1939.

EGG No. 29 (Pl. 29)

Grieve's No. 37; Parkin's No. VII

LOCATION. British Museum (Natural History), London.

HISTORY. One of ten eggs found in the Hunterian Museum of the Royal College of Surgeons in 1861 (*see* No. 11). One of four eggs sold on behalf of the College at Stevens' Rooms on 11th July, 1865 and bought by Mr. A. W. Crichton of Broadwater Hall, Salop for £29. At Crichton's death it passed to Lord Lilford of Oundle, Northamptonshire. It went to the Trustees of the British Museum (Natural History), along with a mounted Great Auk, by bequest in 1949.

EGG No. 30 (Pl. 30)

Grieve's No. 54

LOCATION. Private collection of Captain Vivian Hewitt of Anglesey, North Wales.

HISTORY. In 1835 or 1845 Mr. John Malcolm bought this egg with a skin of the Great Auk from Leadbeater, a London dealer. When Professor Newton enquired as to their origin, all Mr. Malcolm could tell him was that he thought they were collected on one of the Arctic Expeditions and that he bought them for no more than a few pounds. The egg and the skin remained in the Malcolm family until 1948, when they were sold, on 2nd July, to Captain Vivian Hewitt.

EGG No. 31 (Pl. 31)

Grieve's No. 45; Parkin's No. XIV. Figured by Butler, *British Birds with their nests and eggs*, 1896–98, **6**, *pl. 23, fig. 463*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

REMARKS. Exhibited by Edward Bidwell at the meeting of the British Ornithologists' Club on 17th April, 1895. It was described as "especially remarkable for the pitted nature of its shell".

HISTORY. First recorded in the possession of a Mon. Perrot, a Paris dealer in zoological specimens, from whom it was bought by Sir William Milner of Nunappleton, Yorkshire on 23rd November, 1847 for 200 francs (about £8). It passed to his successor Sir Frederick Milner who offered it for sale at Stevens' Rooms on 23rd April, 1895. It was bought for £189 by T. G. Middlebrook, owner of the public house "Edinburgh Castle", Camden Town, London, who kept a Museum on the premises for the interest of his patrons. At Middlebrook's death the egg was bought on 17th January, 1906, through Rowland Ward, by Colonel John E. Thayer of Lancaster, Mass., U.S.A., for £220. It passed with the Thayer collection to the Museum of Comparative Zoology, Harvard, in 1931-32.

EGG No. 32 (Pl. 32)

Grieve's No. 17: Figured by Wolley, *Ootheca Wolleyana*, 1905, *2*: *pl.* 16

LOCATION. University Museum of Zoology, Cambridge.

REMARKS. Hancock made a plaster cast in 1860.

HISTORY. Regarding the origin of this egg one conjecture is that it came from the Island of Eldey, Iceland, about 1841 and went to Hamburg. It was in the possession of a Robert Dunn of Hull, Yorkshire, from whom it was bought by a Mr. Salmon in 1842. The Salmon collection was bequeathed to the Linnean Society, London, but before it was handed over it is thought that a dealer by name of Calvert, who had access to the collection, substituted a suitably marked swan's egg for the Great Auk egg (*vide* Newton in Wolley 1905, *2*: 373). Newton bought the egg from Calvert in 1860 and eventually gave it to the University Museum along with two others. (Nos. 33 and 34.)

EGG No. 33 (Pl. 33)

Grieve's No. 15: Figured by Wolley, *Ootheca Wolleyana*, 1905, *2*: *pl.* 14

LOCATION. University Museum of Zoology, Cambridge.

HISTORY. Believed to be one of a number of Great Auk eggs obtained by Herr Brandt, a Hamburg dealer from the Island of Eldey, Iceland, in 1835. Wolley records (1905, *2*: 365) that Brandt obtained eggs from Iceland through a Carl Sieman of Reykjavik. Sold by Brandt to John Gould on 6th September, 1835, for about £1 3s. 4d (Records vary between £1 8s. and £1 16s.) Gould sold it to the Rev. D. Barclay Bevan of Burton Latimer, near Higham Ferrers, on 1st November, 1836, for £1 8s. Barclay Bevan sold it to John Wolley on 12th December, 1846 for the same price. While in Wolley's possession it was sent to J. Hancock for copying on 22nd February, 1858 and returned on 25th March of the same year. At Wolley's death in 1859 his collection including this egg and No. 34 passed to the brothers Alfred and Edward Newton. Alfred Newton gave it to the University Museum.

EGG No. 34 (Pl. 34)

Grieve's No. 16; Figured by Wolley, *Ootheca Wolleyana*, 1905, **2**; *pl. 15*

LOCATION. University Museum of Zoology, Cambridge.

REMARKS. Hancock made a plaster cast in 1858.

HISTORY. It is believed that it may have come from the Island of Eldey, Iceland, prior to 1837, and may have passed through the hands of a Hamburg dealer. The first owner was traced as Augustus Mason, to whom this egg had been given, when he was at school, by an unknown lady. From Augustus Mason it passed to his brother Alfred, who gave it to a school friend called Thomas E. Davies, who in turn gave it to another school friend called Alfred Dudley. Dudley parted with it sometime between 1840 and 1845, giving it, along with other eggs, to a nephew, William Bree, son of a Warwickshire naturalist. Bree gave it to Mr. J. P. Wilmot of Leamington who gave it in exchange (with Bree's permission) to John Wolley in 1856 (*see* Wolley, 1905, **2**; *367*). At Wolley's death in 1859 this egg along with No. 33 went to the brothers Alfred and Edward Newton; and finally from Alfred Newton to the University Museum.

EGG No. 35 (Pl. 35)

Grieve's No. 18

LOCATION. Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn.

Remarks. Damaged at both ends with a very large hole at the blunt end.

History. First known to have been in the possession of the family of Mr. E. Burgh for over 70 years. Burgh sold it to Mr. Rocke of Aston on Clun, Shropshire, in 1869. On 14th January, 1920 it was sold by Rowland Ward to Professor Alexander Koenig for £200. At Koenig's death in 1940 this egg and the other two in his possession, Nos. 19 and 21 went to the Museum which bears his name.

EGG No. 36 (Pl. 36)

Grieve's No. 8; Figured by Naumann, *Naturgeschichte der Vögel Milteleuropas,* 1897–1905, *pl. 12, fig. 1*

Location. British Museum (Natural History), London.

History. It is believed that this egg originated from Iceland and was once in the possession of Herr Brandt, a naturalist dealer of Hamburg, some time between 1835 and 1839, and that he sold it to a rich senator of that city whose collection was eventually bought by Schulz, a dealer in Leipzig. Schulz sold it to Herr Hühnel, a barber in Leipzig, for it is said 7 thalers (about £1 1s.). Some time before Hühnel's death, probably about 1870, Count Rödern of Breslau bought it from him for 200 thalers (about £30). In about March 1889, the Hon. Walter Rothschild acquired it with Count Rödern's collection. It was bequeathed to the Trustees of the British Museum (Natural History) in 1937 by Lord Rothschild.

EGG No. 37 (Pl. 37)

Grieve's No. 9; Parkin's No. V

Location. Private collection of Captain Vivian Hewitt of Bryn Aber, Anglesey, North Wales.

History. One of ten eggs found by Professor Alfred Newton in the Hunterian Museum of the Royal College of Surgeons and one of four of these sold by auction at Stevens' Rooms on 11th July, 1865 (*see* No. 11). It was bought by John Gould for G. Dawson Rowley of Brighton for £33. At Dawson Rowley's death it passed to his son G. Fydell Rowley, whose executors put it up for auction again at Stevens' Rooms on 14th November, 1934, where it was bought by Captain Vivian Hewitt for £315.

EGG No. 38 (Pl. 38)

Grieve's No. 10

Location. Not known.

Remarks. This egg was not properly blown and the pointed end is broken leaving jagged edges.

History. It is said that this egg originally belonged to Captain Cook. It was in the possession of John Gould who sold it to G. Dawson Rowley of Brighton on 16th March, 1863. At his death it passed to his son G. Fydell Rowley whose executors put it up for auction at Stevens' Rooms on 14th November, 1934, where it was bought by Sir Bernard Eckstein of Wickfield, Sussex, for £273. It was sold in 1947 but we have been unable to trace who bought it. Sir Bernard Eckstein died on 10th May, 1948.

EGG No. 39 (Pl. 39)

Grieve's No. 11

Location. Presumed to be in the private collection of Captain Vivian Hewitt of Anglesey, North Wales.

Remarks. This egg was badly damaged and was crudely repaired by Yarrell.

History. First known to have been in the possession of Leadbeater, a London dealer, who sold it to Mr. J. P. Wilmot for his collection. According to Wilmot it was imperfect and was restored by Yarrell. Wilmot gave it to Mr. Bourman Labrey of Manchester who sold it on 21st October, 1871, to G. Dawson Rowley. At his death it went to his son G. Fydell Rowley. On 14th November, 1934, it was auctioned at Stevens' Rooms and bought by the Rev. F. C. R. Jourdain for £147. The Jourdain collection was dispersed, this egg being purchased by Captain Hewitt, in whose possession it is presumed to be now.

EGG No. 40 (Pl. 40)

Grieve's No. 12

Location. Presumed to be in the private collection of Captain Vivian Hewitt of Anglesey, North Wales.

Remarks. An egg which bears hardly any markings.

History. First recorded as hanging with other sea birds eggs on a string outside a shop in Paris. It was bought by William Yarrell for Lady Cust for the sum of 5 francs. Then G. Dawson Rowley acquired it in 1878 shortly before his death. It passed into the hands of his son G. Fydell Rowley and was then auctioned at Stevens' Rooms on 14th November, 1934 when it was bought by the Rev. F. C. R. Jourdain for £220 10s. On the dispersal of the Jourdain collection it was bought by Captain Hewitt.

EGG No. 41 (Pl. 41)

Grieve's No. 13; Parkin's No. I

Location. Private collection of Captain Vivian Hewitt of Anglesey, North Wales.

Remarks. Still visible on this egg is the inscription "330A No. 1" written by Lord Garvagh.

History. The French Vicomte de Barde owned this egg for some 30 years, with two others (*see* No. 42 and 46). In 1825 his collection went to the Boulogne Museum. In 1852 the Curator of the museum exchanged this egg and the other two for an ostrich skin with James Gardner a dealer in London. Soon after their arrival in London they were bought by T. H. Potts. This egg was purchased for Lord Garvagh for £30 on 24th May, 1853. After the death of Lord Garvagh in 1871, it was sold to G. Dawson Rowley on 7th April, 1873. Like Nos. 37, 39, 40, it was sold to Captain Vivian Hewitt on 14th November, 1934, at Stevens' Rooms, fetching £315.

EGG No. 42 (Pl. 42)

Grieve's No. 14; Parkin's No. II

LOCATION. Private collection of Mr. R. Kreuger of Helsinki, Finland.

REMARKS. This egg was damaged at both ends and subsequently repaired. (It is said that it was dropped by one of Lord Garvagh's footmen.)

HISTORY. Like Nos. 41 and 46 it was first known in the collection of the Vicomte de Barde in the late eighteenth century where it remained for some 30 years. It passed with his egg collection to the Boulogne Museum in 1825. In 1852 the Curator exchanged it together with the other two Great Auk eggs, for an ostrich skin, with James Gardner, the dealer in London. T. H. Potts bought it from Gardner along with Nos. 41 and 46. On 24th May, 1853, Potts offered it for sale, like No. 41, at Stevens' Rooms but bought it in for £29. It was put up for sale again on 7th April, 1854, and was bought by Lord Garvagh for £20. After the death of Lord Garvagh, in 1871, this egg and No. 41 went to G. Dawson Rowley. At the sale held at Stevens' Rooms on 14th November, 1934, it was bought by G. N. Carter of Wolseley Place, Manchester for £105. Some time after Carter's death in July 1956 it became the property of Mr. R. Kreuger of Helsinki, Finland.

EGG No. 43 (Pl. 43)

Grieve's No. 55; Parkin's No. XI. Figured by Parkin, *The Great Auk*, 1911, *pl. 3*

LOCATION. The City Museum, Bristol.

HISTORY. This egg was first heard of in the possession of Mon. Theibaut de Berneaud of Paris. Then Lefevre, a Paris dealer, sold it to Williams a London dealer. On 6th October, 1851, it was bought from Williams for £18 by Mr. Lancelot Holland who gave it to his daughter, Mrs. Henry Wise of Brockham, near Reigate, and subsequently of Charlton Court, Steyning, near Brighton. On 12th March, 1888 it was bought at Stevens' Rooms by James Gardner, the dealer, for £225. He sold it to Sir J. H. Greville Smyth of Ashton Court, Somerset, it is said for £315. At his death in 1901 Lady Greville Smyth presented it to the City Museum, Bristol, together with the rest of his egg collection.

EGG No. 44 (Pl. 44)

Grieve's No. 25; Parkin's No. XVI. Figured by Thayer, *The Auk*, 1912, **29**; *pl. 12*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

REMARKS. There is a small fracture on one side.

HISTORY. The first known owner was Friedrich Schultz of Dresden, Saxony, who sold it on 23rd May, 1841, to Hugh Reid of Doncaster for £2 6s., some say, £5. Reid sold it to Mr. James Hack Tuke of Hitchin, Herts, prior to 1856 for it is referred to by Hewitson (1856) as being in Tuke's possession. Mr. Tuke lent it to the Walden Museum, whose Curator, then a Mr. Maynard, made a cast of it. After the death of Mr. Tuke, it was sold by his executors, by auction at Stevens' Rooms on 20th April, 1896. Mr. Heatly Noble purchased it for Mr. William Newall, 27 Hans Place, London, for £168. In January, 1912, it was purchased by Rowland Ward for Colonel J. E. Thayer of Lancaster, Mass., U.S.A. Like all the other Great Auk eggs owned by Colonel Thayer, it went with the rest of his egg collection to Harvard College Museum in 1931-32.

EGG No. 45 (Pl. 45)

Grieve's No. 49. Figured in the *Report of the Castle Museum, Norwich, 1910*

LOCATION. Castle Museum, Norwich.

HISTORY. It is said to be Icelandic in origin. First recorded in the possession of Herr Brandt, a Hamburg dealer, from whom it was bought by Dr. Pitman. About 1850 Pitman sold it with the rest of his collection to Henry Walter of Pappewick, Nottinghamshire. Later it was bought by James Reeve, Curator of the Castle Museum, Norwich. On his retirement in 1910 he presented it to the Museum.

EGG No. 46 (Pl. 46)

Grieve's No. 46; Parkin's No. XVII. Figured by Butler, *British Birds with their nests and eggs*, 1896–98, **6**; *pl. 23, fig. 464*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

HISTORY. One of three eggs once owned by the Vicomte de Barde (*see* Nos. 41 and 42) and which in 1825 went with his collection to the Boulogne Museum. In 1852 the Curator exchanged the three eggs for an ostrich skin with James Gardner a dealer in London. All three were bought by Mr. T. H. Potts who sold the other two but kept this one and took it with him to New Zealand. After his death in 1888 it was left to his widow in Christchurch. In 1891 it was purchased by Mr. Henry O. Forbes, then Curator of the Canterbury Museum in Christchurch, it was said for a friend in England. It returned there for it was next recorded in the collection of Mr. Leopold Field of London, who subsequently sold it to Rowland Ward. On 13th April, 1897, it was put up for sale by auction at Stevens' Rooms and was purchased by Mr. T. G. Middlebrook of the "Edinburgh Castle", Camden Town, London, for £294. (Mr. Middlebrook kept a "Free Museum" in his public house for the entertainment of his patrons. At one time he owned four Great Auk eggs.) In January 1912 Rowland Ward re-purchased this egg from Mr. Middlebrook for Colonel Thayer of Lancaster, Mass., U.S.A., who finally presented it with his egg collection to the Harvard College Museum in 1931–32.

EGG No. 47 (Pl. 47)

Grieve's No. 26

LOCATION. University Museum of Zoology, Copenhagen.

HISTORY. Nothing is known of its history. In a letter dated 4th February, 1885, Professor J. Steenstrup stated to Symington Grieve that this was the only egg of the Great Auk known to be in Copenhagen.

EGG No. 48 (Pl. 48)

Grieve's No. 2

LOCATION. Museum d'Histoire Naturelle, Angers, France.

REMARKS. Badly damaged and reconstructed in plaster at one end.

HISTORY. According to Professor Blasius it was one of four Great Auk eggs on a string seen in a shop at Brest in 1859. On 12th May, 1862, it was bought by Mon. A. Boreau, then Curator of the Angers Museum.

EGG No. 49 (Pl. 49)

Grieve's No. 50

LOCATION. Museum d'Histoire Naturelle, Paris.

REMARKS. This egg has two circular bands less faded than the rest indicating that it must have been mounted and on show for a long time. The surface of the egg is also partly covered with some sort of varnish giving it a shiny appearance.

HISTORY. All that is known about this egg prior to its entry into the Paris Museum is that sometime in the eighteenth century it belonged to the Abbe Manesse.

EGG No. 50 (Pl. 50)

Grieve's No. 51

LOCATION. Museum d'Histoire Naturelle, Paris.

REMARKS. Bears the inscription, partly faded, "St. Pierre-Miquelon".

HISTORY. The inscription on the egg suggests that it originated in the New World, probably Newfoundland. This egg and No. 51 were discovered in the Lycee de Versailles in December 1873.

EGG No. 51 (Pl. 51)

Grieve's No. 52

LOCATION. Museum d'Histoire Naturelle, Paris.

HISTORY. Similar to No. 50.

EGG No. 52 (Pl. 52)

Grieve's No. 43; Parkin's No. III. Figured by Hewitson, *Eggs of British Birds*, 1846, **3**; *pl. 145, fig. 1*, and by d'Hamonville, *Mém. Soc. Zool. France*, 1888, **1**; *pl.5, fig. A*

LOCATION. Private collection of Captain Vivian Hewitt, Bryn Aber, Anglesey, North Wales.

HISTORY. The Baron Louis d'Hamonville, who later acquired this egg, saw it in William Yarrell's collection in 1851. He recorded (1888: *225*) that Yarrell assured him "it is an English egg" by which he understood that it had originated in the Orkneys or Hebrides. Other reports are that Yarrell discovered it in a fisherman's cottage at Boulogne (Grieve, 1885: *105*), or in a curiosity shop in Paris (Grieve, 1897: *250*) and bought it for a few francs. At Yarrell's death it was auctioned at Stevens' Rooms on 5th December, 1856, and was bought by James Gardner for Mr. Frederick Bond of Kingsbury, Middlesex, for £21. It was later sold to the Baron Louis d'Hamonville of Meurthe et Moselle, France, in 1875, through the agency of Mon. Dubois of Paris. On 22nd February, 1894, it again appeared at Stevens' Rooms where it was bought by Sir Vauncey Crewe of Calke Abbey, Derbyshire, for £315. This was the record price, up to that time, for a Great Auk egg. Again it was offered for sale at Stevens' Rooms on 15th December, 1925, and bought by a Mr. Hirch for £320 5s. The next owner was Commander A. T. Wilson, of Garth House, Garth, Breconshire. In 1934 F. G. Lupton of London acquired it for £305. At his death, his collection was bought and sold again by the firm of Gowland, this egg becoming the property of Captain Vivian Hewitt.

EGG No. 53 (Pl. 53)

Grieve's No. 3, 4, or 5; Parkin's No. XX. Figured by d'Hamonville, *Mém. Soc. Zool France*, 1888, **1**; *pl. 5, fig. D*

LOCATION. Private collection of J. W. Tomkinson of Trimpley, Worcestershire.

HISTORY. In 1855 the Baron Henri de Veze purchased it from the Paris dealer Parzudaki for 500 francs. In 1858 the Comte Raoul de Barace of Angers acquired it through the agency of Fairmaire of Paris. After the Comte's death, it was sold, with his collection, to the Baron Louis d'Hamonville in March 1887, making his number of Great Auk eggs four. (*See also* Nos. 52, 54, and 55.) After his death it was offered for sale at Stevens' Rooms on 29th October, 1901, where it was purchased by Mr. Herbert Massey of Ivy Lea, Burnage, Didsbury, Cheshire for £252. On 13th February, 1901, Edward Bidwell had exhibited this egg at the meeting of the British Ornitholigist's Club on behalf of Mr. Henry Stevens. In December 1939, Gerald Tomkinson of Wolverley, Worcestershire, purchased it from H. Massey's executors, through the agency of Mr. G. H. Lings, for £400. With it he obtained also a set of photographs of 69 Great Auk eggs taken by Edward Bidwell, together with the list of 71 eggs he published in 1892. At the death of Gerald Tomkinson in 1959 it passed to his son, John W. Tomkinson.

EGG No. 54 (Pl. 54)

Grieve's No. 3, 4 or 5; Parkin's No. XV. Figured in *Mém. Soc. Zool. France,* 1888, *pl. 6, fig. C*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

REMARKS. This egg is slightly cracked but noted for its beautiful pale green markings and blotches.

HISTORY. Believed to have been taken in Iceland about 1830 and brought to France by a ship owner of St. Malo. He bequeathed it to Comte Raoul de Barace of Angers. At his death it was purchased with his collection by the Baron Louis d'Hamonville in March 1887 along with Nos. 53 and 55. On 25th June, 1895 it was sold by auction at Stevens' Rooms to Jay & Co., fur merchants of London for £173 5s. Again it was offered for sale at the same place on 27th June, 1897 and was purchased by T. G. Middlebrook of the public house "Edinburgh Castle", Camden Town, London, for his museum, for the sum of £168. It was afterwards obtained by Colonel J. E. Thayer of Lancaster, Mass., U.S.A. through Rowland Ward, in 1905 for £200. In 1931–32 it went to the Harvard College Museum with Colonel Thayer's collection.

EGG No. 55 (Pl. 55)

Grieve's No. 3, 4, or 5; Parkin's No. XVIII. Figured in *Mém. Soc. Zool. France,* 1888, *pl. 6, fig. B*

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

HISTORY. Similar to No. 54 up to 19th July, 1899, when Baron Louis d'Hamonville offered it for sale by auction at Stevens' Rooms. It was bought by T. G. Middlebrook of the public house "Edinburgh Castle", Camden Town, for the sum of £315. In 1906 Rowland Ward bought this egg for £110 on behalf of Colonel John Thayer, Lancaster, Mass., U.S.A. In 1931–32 this egg, with Thayer's collection, became the property of Harvard College Museum.

EGG No. 56 (Pl. 56)

Grieve's No. 6 or 7

LOCATION. Believed to be in the private collection of Captain Vivian Hewitt of Anglesey, North Wales.

HISTORY. This egg and No. 57 were brought by the Captain of a whaling vessel, probably from Newfoundland, and given to a merchant in Bergues, France, who in turn gave them to a young man starting an egg collection. After his death the whole egg collection was bought by Mon. de Meezemaker, and then about 1900 it was sold to Mon. Alfred Vaucher of Lausanne. His son, Jacques Vaucher, remembers selling it in March 1937 to an Englishman who, from the description he gives of him and of his special interest in eggs of the birds of prey, seems to be Captain Vivian Hewitt.

We have been unable to get confirmation from Captain Hewitt that the egg is in his possession.

EGG No. 57 (Pl. 57)

Grieve's No. 6 or 7

LOCATION. Private possession of Mon. Heim de Balzac of 34 Rue Hamelin, Paris.

HISTORY. Similar to No. 56 except that Mon. de Meezemaker sold it to Mon. Heim de Balsac in 1924 for 8,000 francs (about £100).

EGG No. 58 (Pl. 58)

Grieve's No. 20; Parkin's No. XXIII

LOCATION. The University, Aberdeen, Natural History Department.

REMARKS. When exhibited at the meeting of the British Ornithologists' Club on 17th June, 1908, by Mr. E. Bidwell, it was shown that this egg bore the inscription "Pingouin", which is believed to have been written by Mon. Dufresne, keeper of the King's Cabinet in Paris in the early nineteenth century.

HISTORY. Possibly at one time in the French Royal collections (*see* Remarks). From 1847 to 1863 known to have been in the collection of Mon. J. Hardy of Dieppe, a ship owner and distinguished ornithologist, to whom it is thought it may have been given by Temminck as a token of gratitude for some service. After Hardy's death it became the property of his son Michel who apparently lent it to the Dieppe Museum, where his father had already deposited his collection of birds. Michel Hardy's daughter Madame Ussel of Eu later must have become the owner for she had it put up for sale at Stevens' Rooms in London on 9th February, 1909, when it was bought by Mr. R. Hay Fenton of Lombard Street, London. On 11th March, 1909, Mr. Hay Fenton presented it to the Natural History Department of Aberdeen University.

EGG No. 59 (Pl. 59)

Grieve's No. 21; Figured in Thienemann, *Einhundert Tafeln coloriter Abbildungen von Vogeleiern*, 1845–54, *pl. IV c (i.e. 96):* and by Naumann, *Naturgeschichte der Vögel Mitteleuropas*, 1897–1905, *pl. 12, fig. 4*

LOCATION. Not known.

HISTORY. Once in the possession of Fredk. Thienemann of Dresden and then in the Staatliches Museum fur Tierkunde, Dresden. This Museum was badly damaged during the 1939–45 war and it has not been possible to find out what happened to the egg. It is believed to have been among the precious objects stored in twelve big cases in the historic fortress of Königheim. These cases disappeared following the Russian occupation.

EGG No. 60 (Pl. 60)

Grieve's No. 47; Figured by Naumann, *Naturgeschichte der Vögel Mitteleuropas,* 1897–1905, *pl. 12, fig. 2*

LOCATION. Museum of Natural History, Oldenburg, East Germany.

HISTORY. Little is known about this egg and what has become of it. Believed to have been in the collection of Dr. Graba of Kiel, whose collection went to the Grand Ducal Museum, Oldenburg, about 1839. It was photographed there by Edward Bidwell about 1892. On the authority of Dr. E. Stresemann of Berlin it is still in the Museum at Oldenberg.

EGG No. 61 (Pl. 61)

Grieve's No. 22. Figured by Naumann, *Naturgeschichte der Vögel Mitteleuropas,* 1897–1905, *pl. 12, fig. 3*

LOCATION. Museum Löbbeckeanum, Dusseldorf, West Germany.

REMARKS. This egg was cracked but skilfully repaired.

HISTORY. Fredk. Thienemann of Dresden bought it from Perrot, a Paris dealer, in 1846, for 100 francs (about £4), for Fredk. Löbbecke of Rotterdam, who died on 29th February, 1856. It was inherited, along with his egg collection, by his nephew Th. Löbbecke of Duisburg who added it to his private collection which became the Museum Löbbeckeanum at Dusseldorf.

EGG No. 62 (Pl. 62)

Grieve's No. 1

LOCATION. Zoologisch Museum, Amsterdam, Holland.

HISTORY. This egg and No. 63 were in the possession of the Royal Museum of Natural History, Leiden (now State Museum of Natural History), whose director in 1860, H. Schlegel, stated that they were procured from a French whaler early in the century. A Mr. G. A. Frank of London told Symington Grieve in 1885 that he believed both had been in the possession of his father or grandfather who sold them to Temminck. Some time between 1840 and 1845 Temminck gave this egg in exchange to Dr. Westerman of the Leiden Museum. In 1859 the director at that time H. Schlegel, stated that the egg was presented to the Royal Zoological Society of Amsterdam. This society maintained a Zoological Gardens and a Museum. The latter became incorporated into the Zoological Museum of Amsterdam.

EGG No. 63 (Pl. 63)

Grieve's No. 28

LOCATION. State Museum of Natural History, Leiden, Holland.

HISTORY. Like No. 62 it is believed that this egg was brought to Europe in a whaler, probably from Newfoundland. It is recorded as having been in the possession of a Mr. Frank of London who sold it to Temminck, in whose collection it must have been before 1820. From Temminck it went to the Museum in Leiden.

EGG No. 64 (Pl. 64)

Grieve's No. 29

LOCATION. Bocage Museum, Lisbon, Portugal.

HISTORY. There is a tradition that this egg was brought from a Museum in Italy by one of the kings of Portugal, and offered to the Museum in Lisbon about the middle of the nineteenth century. It came to light among the contents of the museum in 1884.

EGG No. 65 (Pl. 65)

Grieve's No. 27

LOCATION. Zoological Museum, Lausanne, Switzerland.

HISTORY. This egg and No. 7 are believed to have belonged to Levaillant, who died in 1824, and then probably to Professor D. A. Chavannes, who died about 1846. It is thought that the town of Lausanne acquired it with Professor Chavannes' collection. It was found in the Museum with the other egg by the curator, Dr. Depierre, about 1860. (For fuller notes *see* No. 7.)

EGG No. 66 (Pl. 66)

Grieve's No. 53. Figured by des Murs, *Rev. Mag. Zool., 1863, pl. 2*

LOCATION. Academy of Natural Sciences, Philadelphia, U.S.A.

HISTORY. This egg and No. 67 were once in the possession of Mon. des Murs who bought eggs for his collection from Paris dealers. He recorded (1863: *4*) that he bought one from Launoy on the 3rd of June, 1830, for 5 francs and the other from Bevalet on 10th May, 1833, for 3 francs. His collection, including these two eggs, was purchased in 1849 by Dr. Thomas Wilson of the Academy of Natural Sciences, Philadelphia. When received, no mention was made of any specific egg but an entry in an old catalogue appears as "No. 1214 Alca Impennis Linn, Arctic Europe, des Murs 2". One of these eggs, No. 67, was later sent to the Smithsonian Institute. Mon. des Murs stated (1863: *5*) that he possessed three eggs of the Great Auk, but the existence of a third has been questioned (Grieve, 1897: *264*). Whether there ever was a third egg and if it ever reached the Academy is not possible to prove but it is interesting to mention that Mr. James A. G. Rehn, Curator of Entomology at the Academy, remembers, in his early days, seeing fragments of a Great Auk egg. When later Cassin talked to Professor Newton he only mentioned two eggs. Possibly if the third had been broken in transit he may not have felt it worth mentioning or cataloguing. This egg was not photographed by Bidwell and those shown have been kindly presented by the Academy of Natural Sciences.

EGG No. 67 (Pl. 67)

Grieve's No. 66. Figured by Des Murs, *Rev. Mag. Zool.*, 1863, *pl. 1*

LOCATION. Smithsonian Institute, United States National Museum, Washington, D.C.

REMARKS. This egg had been damaged at one end and repaired.

HISTORY. One of the Des Murs eggs (*see* No. 66). Transferred from the Academy of Natural Sciences Philadelphia to the Smithsonian Institute. It was not photographed by E. Bidwell and the one shown here was presented by the Smithsonian Institute.

EGG No. 68 (Pl. 68)

Parkin's No. XXIV

LOCATION. Not known.

HISTORY. Originally in a large collection of Natural history specimens belonging to Mr. W. Shepherd of Bristol and labelled as a penguin egg; it remained unrecognised as a Great Auk egg for a long time, not being recorded by Symington Grieve in 1885. In 1820 the Shepherd collection was bought by the grandfather of a Mr. S. E. Shirley of Stratford-on-Avon, whose property it eventually became. The egg came up for sale at Stevens' Rooms on 7th June, 1910, when it was bought by Mr. E. L. Ambrecht of Grosvenor Square, London, for £262 10s. It was offered for sale again at Stevens' Rooms on 21st November, 1912, when it was bought by Rowland Ward for £231. Unfortunately the records of this firm were destroyed by fire during the second world war and it is not known what became of the egg.

EGG No. 69 (Pl. 69)

Parkin's No. XII

LOCATION. Private collection of Captain Vivian Hewitt of Anglesey, North Wales.

HISTORY. This egg and No. 70 are first known to have been owned by a Mr. Hulkes, a brewer, who had them from his grandfather. They were offered for sale by auction at the Little Hermitage, Higham, nr. Rochester, on 14th March, 1894, and bought by Mr. Wallace Hewett of Newington for thirty-six shillings. He is said to have been unaware of their value and carried them home in his handkerchief. After this treatment it is not surprising that both eggs suffered some damage. They were identified as Great Auk eggs by Dr. R. Bowdler Sharpe of the British Museum (Natural History) and were offered for sale at Stevens' Rooms on 24th April, 1894. This egg was bought by Herbert Massey of Didsbury, Cheshire, for £273. At his death it was bought by Captain Hewitt.

EGG No. 70 (Pl. 70)

Parkin's No. XIII

LOCATION. Museum of Comparative Zoology, Harvard College, Cambridge, Mass., U.S.A.

HISTORY. Similar to No. 69 until sold at Stevens' Rooms on 24th April, 1894, when it was bought by Mr. Henry Munt of Kensington, London, for £183 15s. Shortly after it was acquired by Mr. Edward Bidwell who first collected information on the eggs known at that time. The egg was again put up for sale on 20th June, 1900, at Stevens' Rooms and went to James Gardner, a dealer, for £189, who presumably disposed of it to Sir J. H. Greville Smythe of Ashton Court, Somerset. It was not long in his possession for he died and once again it came up for sale at Stevens' Rooms on 17th April, 1912, where it fetched £157, being purchased by Rowland Ward for Colonel John Thayer of Lancaster, Mass., U.S.A. It was finally presented with his egg collection to the Harvard College Museum in 1931-32.

EGG No. 71 (Pl. 71)

Grieve's No. 36; Parkin's No. VIII

LOCATION. Private collection of Sir John Stirling, Muir of Ord, Ross-shire.

HISTORY. The first-known record of this egg is its purchase by A. D. Bartlett in about 1838 from either a Mr. Dunn or a Mr. Hoy. In 1842 it was sold to a Mr. E. Maunde for £2. Bartlett re-purchased it about 1851. Then in 1852 it was sold to Dr. Nathaniel Troughton for £5. On 27th April, 1869, it was sold to the second Lord Garvagh, Garvagh Hall, Londonderry for £64. It then passed to Lady Garvagh in 1871 and to her daughter the Hon. Emmeline R. Canning in 1891. At her death on 19th February, 1898, the egg was found at her residence in London by Mr. J. E. Harting, Secretary of the Linnaean Society, and on 17th April of the same year it was purchased by Mr. Heatley Noble of Henley-on-Thames. On 19th May, 1904, it appeared at Stevens' Rooms when it was bought in at £200, and again on 16th March, 1905, when it was purchased by William Stirling of Muir of Ord for £210. Finally it passed to his son Sir John Stirling.

EGG No. 72 (Pl. 72)

Parkin's No. XIX

LOCATION. Museum of Natural History, Reykjavik, Iceland.

REMARKS. This egg has large holes at both ends.

HISTORY. Nothing is known about this egg until it was in the possession of Sir Greville Smythe. It is thought that he obtained it through the dealer Gardner who had bought an unrecorded egg from a French collection at Stevens' Rooms on 20th June, 1900, for £330 15s. Sir Greville Smythe died in 1901 and his widow Lady Emily offered it for sale at Stevens' Rooms on 17th April, 1912 when it was purchased by Rowland Ward for Colonel John Thayer of Lancaster, Mass., U.S.A. for £147. In 1931-32 it went with the Thayer collection to the Museum of Comparative Zoology, Harvard. Then in 1954 it was sold to its present owners.

EGG No. 73 (Pl. 73)

Location. Private collection of M. le Marquis de Tristan, Clery St. Andre, France.

Remarks. When discovered the egg was badly fractured at 1½ inches from the smaller end, but the Comte de Tristan had it skilfully repaired. It is described as having a pale yellow ground colour, the large end being well covered with dark markings. When Bidwell saw it there was a faded inscription "Pingouin".

History. In the records of his collection, which he made in 1935, the previous Marquis de Tristan, who died in 1944, stated that the egg was brought from Scotland by an ancestor before 1820. This egg remained unrecorded until it was first mentioned in the *Revue Francaise d'Ornithologie* for April 1913, by the Comte de Tristan who stated that he found the egg in a cupboard at his Château de l'Emerillon which had not been opened for many years. Apparently the egg belonged to the Comte's great-grandfather who travelled a great deal and brought home many interesting specimens. He died in January 1861 and his herbarium, specimens and manuscripts remained untouched until 1910.

EGG No. 74 (Pl. 74)

Location. City Museum, Bristol.

History. Apparently the egg was purchased many years ago by Sir Greville Smythe of Bristol with a number of other sea-bird eggs. When he died in 1901 the egg came into the possession of his daughter the Hon. Esme Smythe who in 1945 donated it to the Bristol Museum in memory of Dr. H. Bolton, Director of the Museum for many years.

EGG No. 75 (Pl. 75)

Location. American Museum of Natural History, New York.

History. Very little is known about this egg. It was in the possession of a Mr. P. B. Philip, owner of a most extensive collection of eggs, mainly North American, who presented this collection to the American Museum of Natural History in 1937.

Appendix "A"
Comparison by Countries of Private and Museum Owned Eggs.

	Year 1892 with additions to 1900		Year 1965	
COUNTRY	MUSEUMS	PRIVATE	MUSEUMS	PRIVATE
Great Britain	16	34	26	15
U.S.A.	2	—	13	—
France	4	7	4	2
Germany	2	1	5	—
Holland	2	—	2	—
Denmark	1	—	1	—
Switzerland	1	—	1	—
Portugal	1	—	1	—
Iceland	—	—	1	—
Finland	—	—	—	1
Total	29	42	54	18

It has not been possible to trace the present whereabouts of three eggs recorded in Bidwell's List of 1892 which are omitted from the above figures for 1965. These are:—

No. 38	Sir Bernard Eckstein	(Owner up to 1947)
No. 59	Dresden	(Lost in 1939–45 War)
No. 68	Rowland Ward	(Records lost in 1939–45 War)

Grieve No. 42 was destroyed by fire in 1872.

Appendix "B"

Bidwell List of Owners of Great Auk Eggs 1892 and additions to 1900

1. British Museum, Natural History, Cromwell Road, London.
2. British Museum, Natural History, Cromwell Road, London.
3. Museum of Science and Art, Edinburgh.
4. Museum of Science and Art, Edinburgh.
5. University Museum, Cambridge.
6. University Museum, Cambridge.
7. University Museum, Cambridge.
8. University Museum, Cambridge.
9. University Museum, Cambridge.
10. University Museum, Oxford.
11. Royal College of Surgeons, London.
12. Royal College of Surgeons, London.
13. Royal College of Surgeons, London.
14. Derby Museum, Liverpool.
15. Natural History Museum, Newcastle-on-Tyne.
16. Philosophical Society's Museum, Scarborough.
17. Mr. Edward Bidwell, Twickenham.
18. Mr. Robert Champley, Scarborough.
19. Mr. Robert Champley, Scarborough.
20. Mr. Robert Champley, Scarborough.
21. Mr. Robert Champley, Scarborough.
22. Mr. Robert Champley, Scarborough.
23. Mr. Robert Champley, Scarborough.
24. Mr. Robert Champley, Scarborough.
25. Mr. Robert Champley, Scarborough.
26. Mr. Robert Champley, Scarborough.
27. Mr. Philip Crowley, Waddon, Surrey.
28. Mr. Herbert Massey, Didsbury, Lancs.
29. Lord Lilford, Lilford Hall, Northants.
30. Mr. John Malcolm, Poltallock, Argyllshire.
31. Sir Frederick Milner, Nunappleton, Yorks.
32. Prof. Newton, Cambridge.
33. Prof. Newton, Cambridge.
34. Prof. Newton, Cambridge.
35. Mr. John C. L. Rocke, Clungunford, Salop.
36. Hon. Walter Rothschild, Tring Park, Herts.
37. Mr. G. Fydell Rowley, Brighton.
38. Mr. G. Fydell Rowley, Brighton.
39. Mr. G. Fydell Rowley, Brighton.
40. Mr. G. Fydell Rowley, Brighton.
41. Mr. G. Fydell Rowley, Brighton.
42. Mr. G. Fydell Rowley, Brighton.
43. Sir Greville Smythe, Ashton Court, Somerset.
44. Mr. James H. Tuke, Hitchin, Herts.
45. Mr. Henry Walter, Papplewick, Notts.
46. Mr. Leopold Field, London.
47. Royal University Museum, Copenhagen.
48. Natural History Museum, Angers.
49. Museum of Natural History, Paris.
50. Museum of Natural History, Paris.
51. Museum of Natural History, Paris.
52. Baron Louis d'Hamonville, Manonville.
53. Baron Louis d'Hamonville, Manonville.
54. Baron Louis d'Hamonville, Manonville.
55. Baron Louis d'Hamonville, Manonville.
56. Mon. De Meezemaker, Bergues les Dunkerque.
57. Mon. De Meezemaker, Bergues les Dunkerque.
58. Mon. M. Hardy, Perigueux.
59. Royal Zoological Museum, Dresden.
60. Grand Ducal Museum, Oldenburg.
61. Herr. Th. Lobbecke, Dusseldorf.
62. Zoological Museum, Amsterdam.
63. Zoological Museum, Leyden.
64. National Museum, Lisbon.
65. Museum of Natural History, Lausanne.
66. Academy of Natural Sciences, Philadelphia.
67. Smithsonian Institute, Washington.
68. Mr. S. Evelyn Shirley, Ettington, Warwickshire.
69. Mr. Herbert Massey, Didsbury, Lancs.
70. Sir Greville Smythe, Ashton Court, Somerset.
71. Mr. Heatley Noble, Henley-on-Thames.

Appendix "C"

Tomkinson List of Owners of Great Auk Eggs 1965

1. British Museum (Natural History), Cromwell Road, London, S.W.7.
2. British Museum (Natural History), Cromwell Road, London, S.W.7.
3. Royal Scottish Museum, Edinburgh, 1.
4. Royal Scottish Museum, Edinburgh, 1.
5. University Museum of Zoology, Cambridge, England.
6. University Museum of Zoology, Cambridge, England.
7. University Museum of Zoology, Cambridge, England.
8. University Museum of Zoology, Cambridge, England.
9. University Museum of Zoology, Cambridge, England.
10. University Museum, Oxford.
11. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
12. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
13. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
14. City of Liverpool Museum, (Dept. of Zoology), Liverpool.
15. Hancock Museum, Natural History Soc. of Northumberland, Newcastle-upon-Tyne.
16. Scarborough Natural History Museum, The Crescent, Scarborough, Yorkshire.
17. Spalding Gentleman's Soc. Museum, Broad Street, Spalding, Lincolnshire.
18. Castle Museum, Norwich, Norfolk.
19. The Museum Alexander Koenig, Bonn, Western Germany.
20. British Museum (Natural History), Cromwell Road, London, S.W.7.
21. The Museum Alexander Koenig, Bonn, Western Germany.
22. Major Sir John Stirling, K.T., Muir of Ord, Ross-shire, Scotland.
23. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
24. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
25. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
26. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
27. British Museum (Natural History), Cromwell Road, London, S.W.7.
28. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
29. British Museum (Natural History), Cromwell Road, London, S.W.7.
30. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
31. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
32. University Museum of Zoology, Cambridge, England.
33. University Museum of Zoology, Cambridge, England.
34. University Museum of Zoology, Cambridge, England.
35. The Museum Alexander Koenig, Bonn, Western Germany.
36. British Museum (Natural History), Cromwell Road, London, S.W.7.
37. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
38. Not located. Sold about 1947 by Sir Bernard Eckstein.
39. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
40. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
41. Capt. Vivian Hewitt, Cemaes Bay, Anglesey, N. Wales.
42. R. Kreuger, Stockholmsgatan 17, Helsingfors, Finland.
43. City Museum, Queen's Road, Bristol, 8.
44. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
45. The Castle Museum, Norwich, Norfolk.
46. Museum of Comparative Zoology, Harvard College, Cambridge, U.S.A.
47. University Museum of Zoology, Copenhagen, Denmark.
48. Museum d'Histoire Naturelle, Angers, France.
49. Museum d'Histoire Naturelle, 55 Rue Buffon, Paris, France.
50. Museum d'Histoire Naturelle, 55 Rue Buffon, Paris, France.

51. Museum d'Histoire Naturelle,
55 Rue de Buffon, Paris, France.
52. Capt. Vivian Hewitt,
Cemaes Bay, Anglesey, N. Wales.
53. Mr. J. W. Tomkinson,
Trimpley, Nr. Bewdley,
Worcestershire.
54. Museum of Comparative Zoology,
Harvard College, Cambridge, U.S.A.
55. Museum of Comparative Zoology,
Harvard College, Cambridge, U.S.A.
56. Capt. Vivian Hewitt,
Cemaes Bay, Anglesey, N. Wales.
57. Mon. Heim de Balsac,
34 Rue Hamelin, Paris, France.
58. Museum of Natural History,
Marischel College, Aberdeen.
59. Not located—last known at:
Museum of Natural History,
Augustus Str. 2, Dresden, East Germany.
60. Museum of Natural History,
Oldenburg, East Germany.
61. Museum Lobbeakeanum,
Dusseldorf, Western Germany.
62. Zoological Museum, Amsterdam (c),
Holland.
63. Rijksmuseum Raamsteeg 2, Leiden,
Holland.
64. Zoological Museum, Lisbon, Portugal.
65. Museum of Zoology, Lausanne,
Switzerland.
66. Academy of Natural Sciences,
Philadelphia, U.S.A.
67. Smithsonian Institute National
Museum, Washington, U.S.A.
68. Not located. Bought by Rowland Ward
in 1912.
69. Capt. Vivian Hewitt,
Cemaes Bay, Anglesey, N. Wales.
70. Museum of Comparative Zoology,
Harvard College, Cambridge, U.S.A.
71. Major Sir John Stirling, K.T.,
Muir of Ord, Ross-shire, Scotland.
72. Museum of Natural History,
Reykjavik, Iceland.
73. Mon. le Marquis de Tristan,
Cléry St. André, Loiret, France.
74. City Museum, Queen's Road, Bristol, 8.
75. The American Museum of Natural
History, New York, U.S.A.

Appendix "D"
Comparison of Egg Numbers

Tomkinson No.	Bidwell No.	Grieve No.	Parkin No.
1	1	31/32	25
2	2	31/32	26
3	3	23	
4	4	24	
5	5	38	9
6	6	39	10
7	7	40	
8	8		
9	9	41	
10	10	48	
11	11	33	
12	12	34	
13	13	35	
14	14	30	
15	15	44	
16	16	56	
17	17	68	4
18	18	57	22
19	19	58	
20	20	60	
21	21	59	
22	22	61	21
23	23	62	
24	24	63	
25	25	64	
26	26	65	
27	27	19	
28	28	67	6
29	29	37	7
30	30	54	
31	31	45	14
32	32	17	
33	33	15	
34	34	16	
35	35	18	
36	36	8	
37	37	9	5
38	38	10	
39	39	11	
40	40	12	
41	41	13	1
42	42	14	2
43	43	55	11
44	44	25	16
45	45	49	
46	46	46	17
47	47	26	
48	48	2	
49	49	50	
50	50	51	
51	51	52	
52	52	43	3
53	53	3/4/5	20
54	54	3/4/5	15
55	55	3/4/5	18
56	56	6/7	
57	57	6/7	
58	58	20	23
59	59	21	
60	60	47	
61	61	22	
62	62	1	
63	63	28	
64	64	29	
65	65	27	
66	66	53	
67	67	66	
68	68		24
69	69		12
70	70		13
71	71	36	8
72			19
73			
74			
75			

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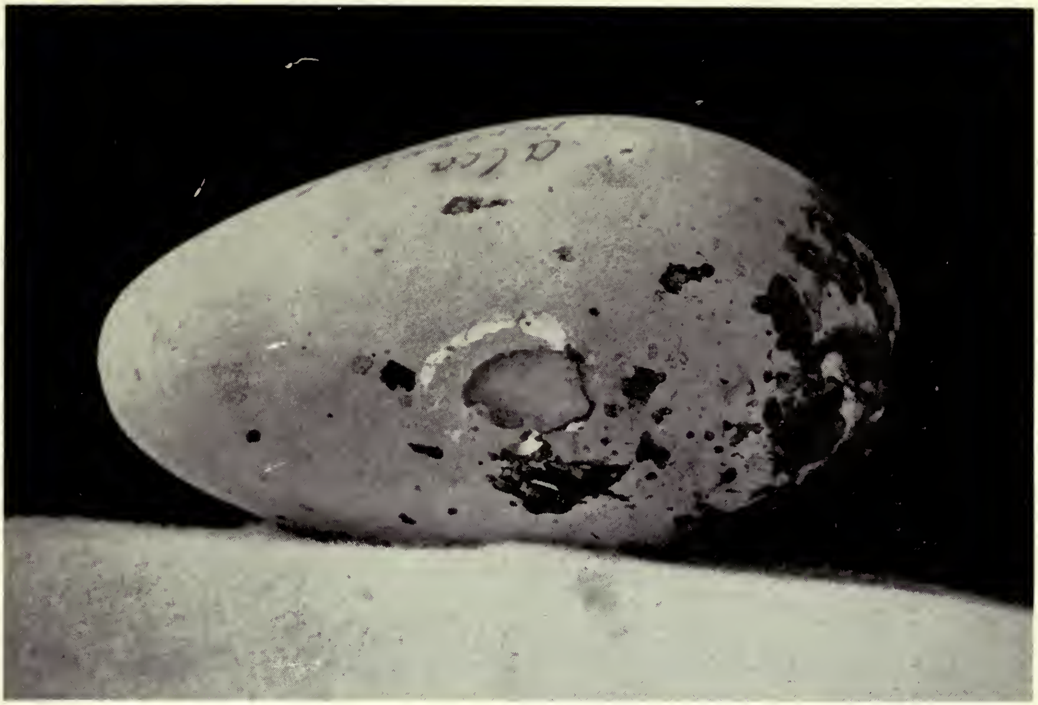
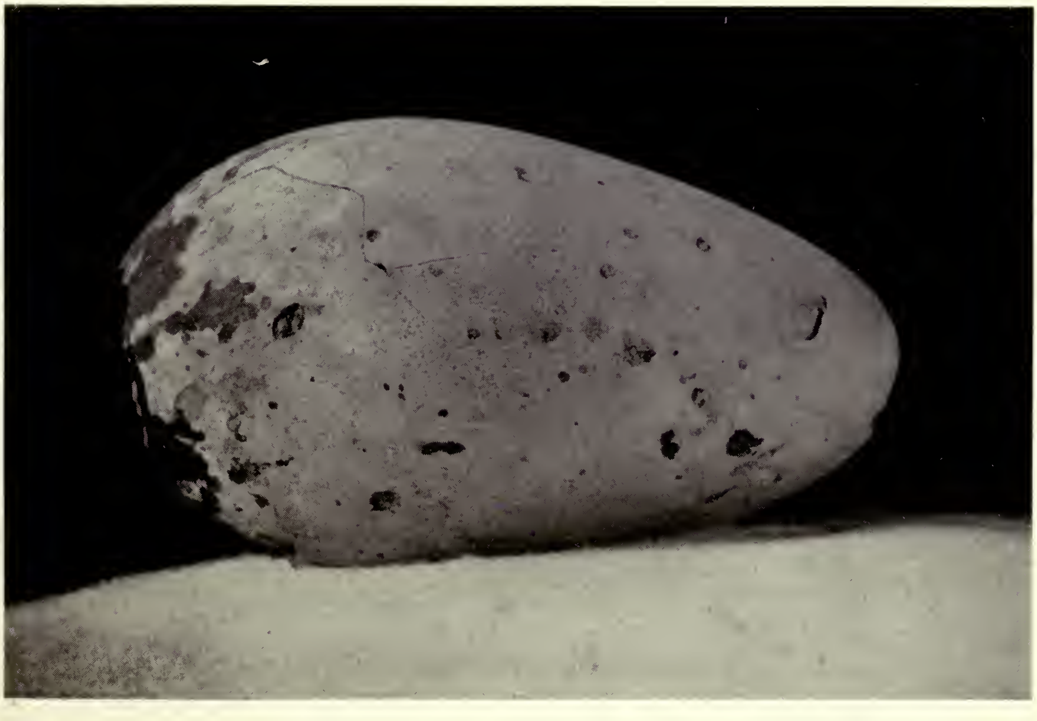
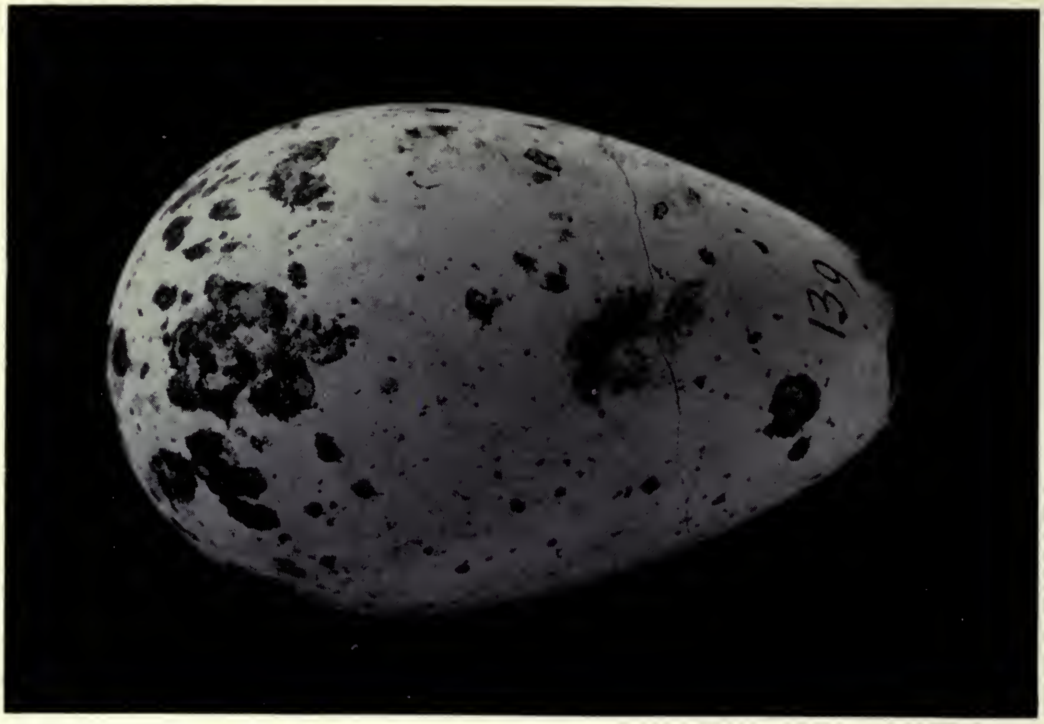
Plates 66, 67, 72-75 are natural size and the remainder are approximately 9/10 of natural size.

All plates are from untouched photographs.



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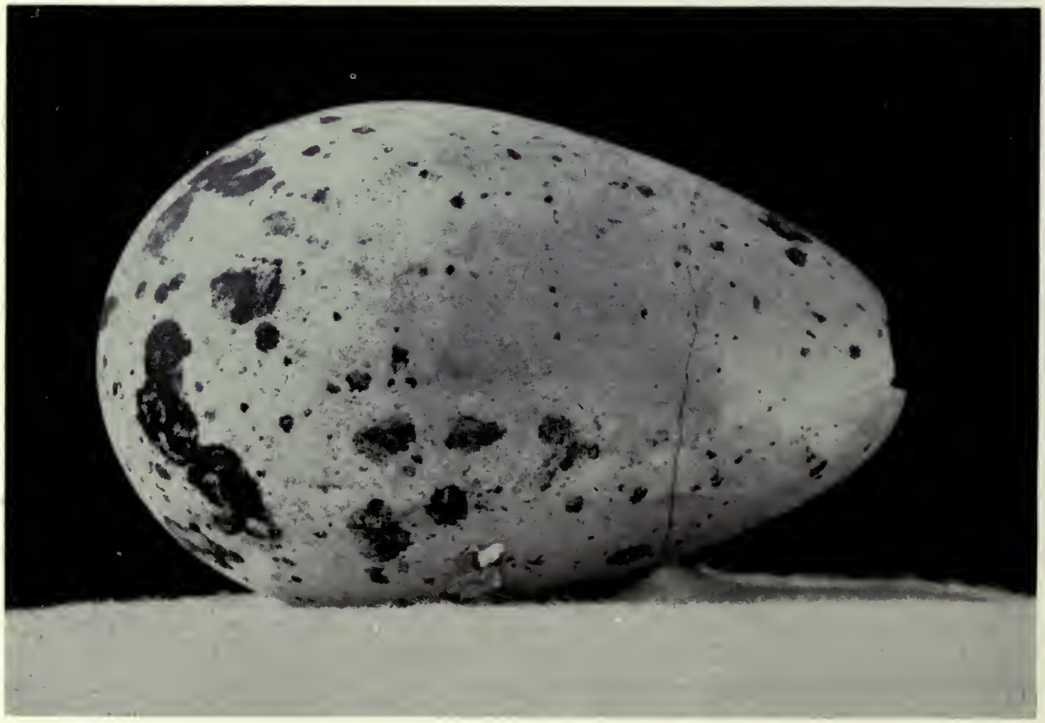

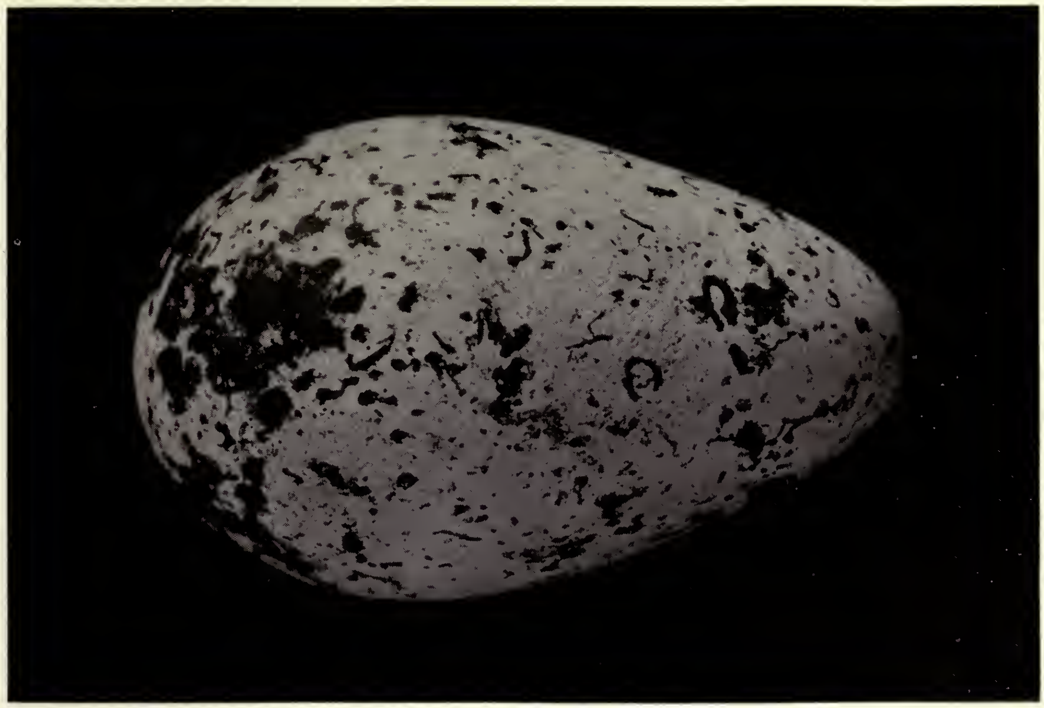

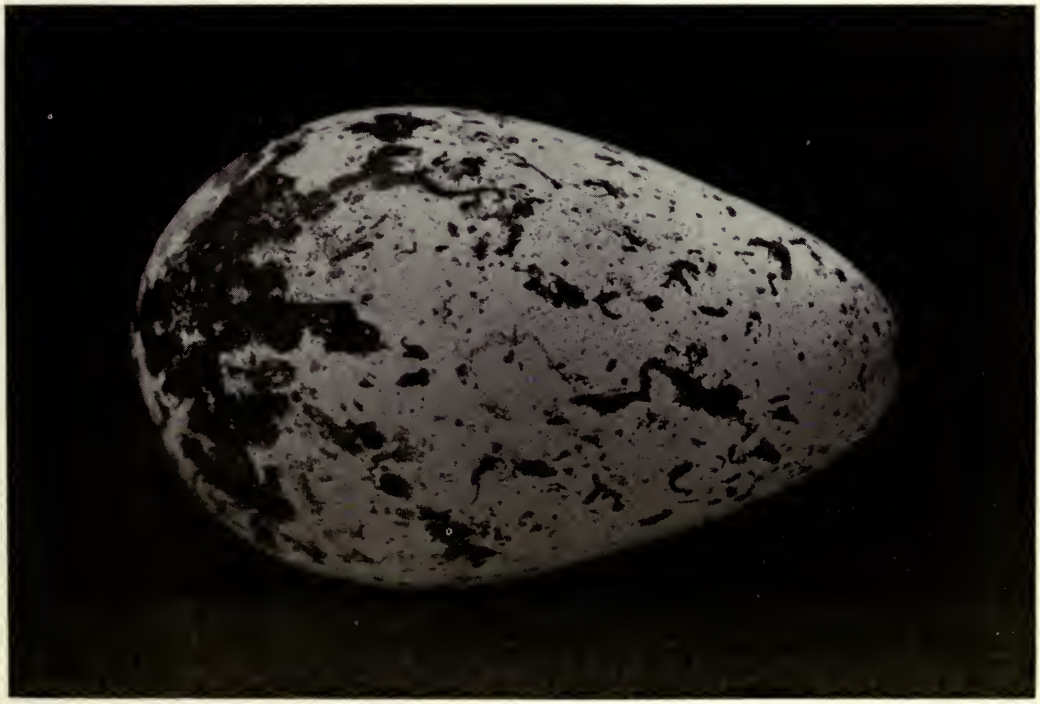

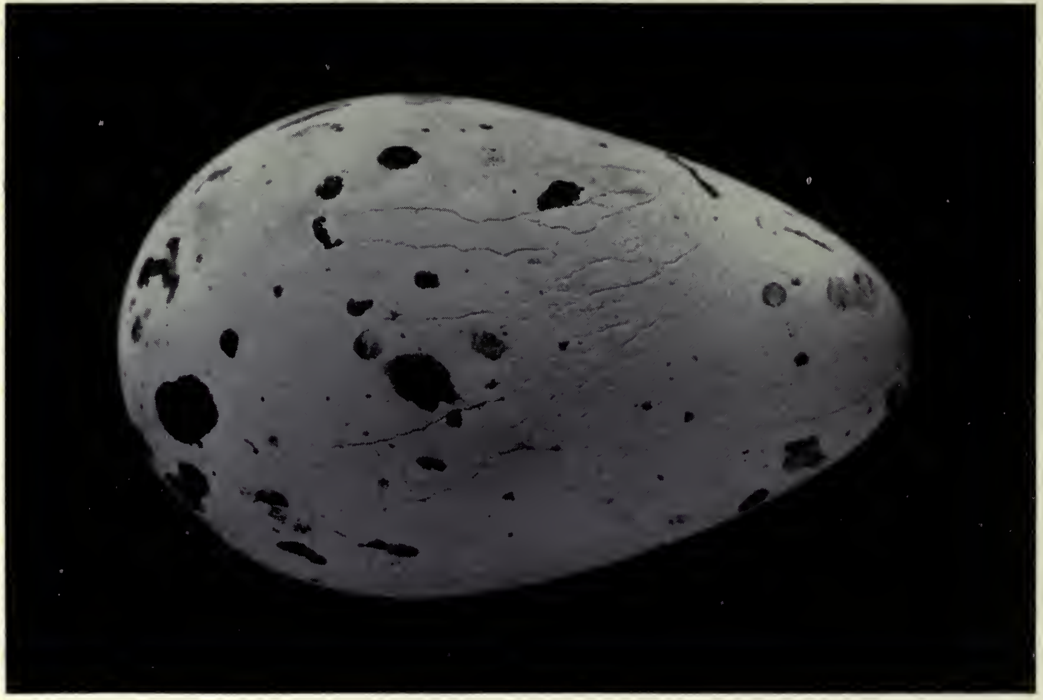

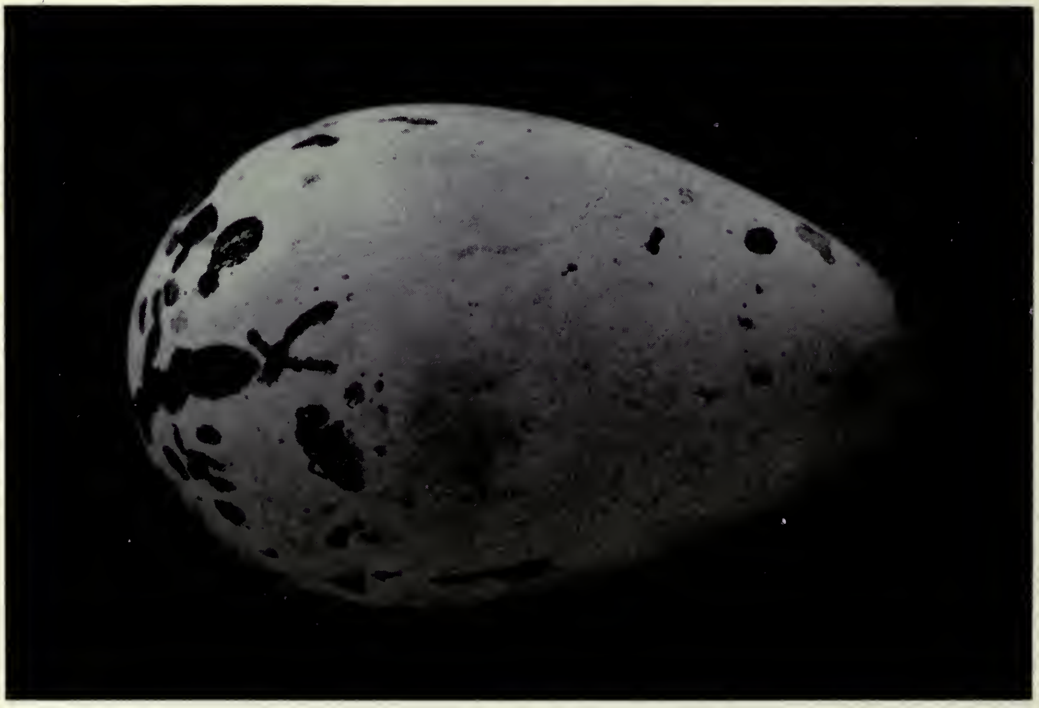

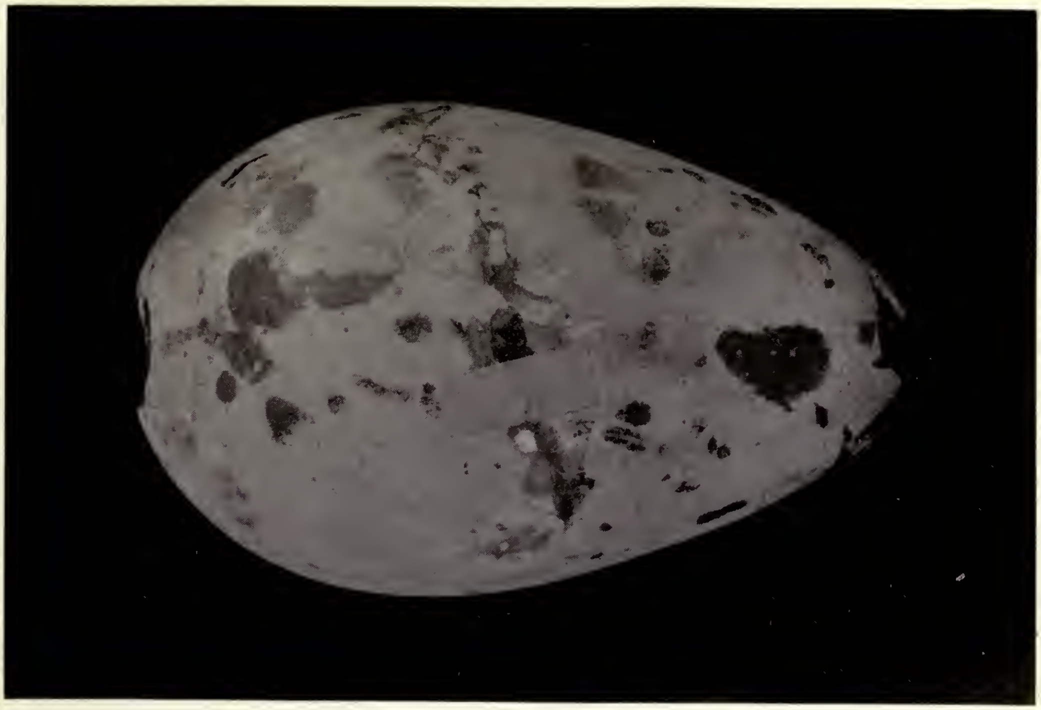

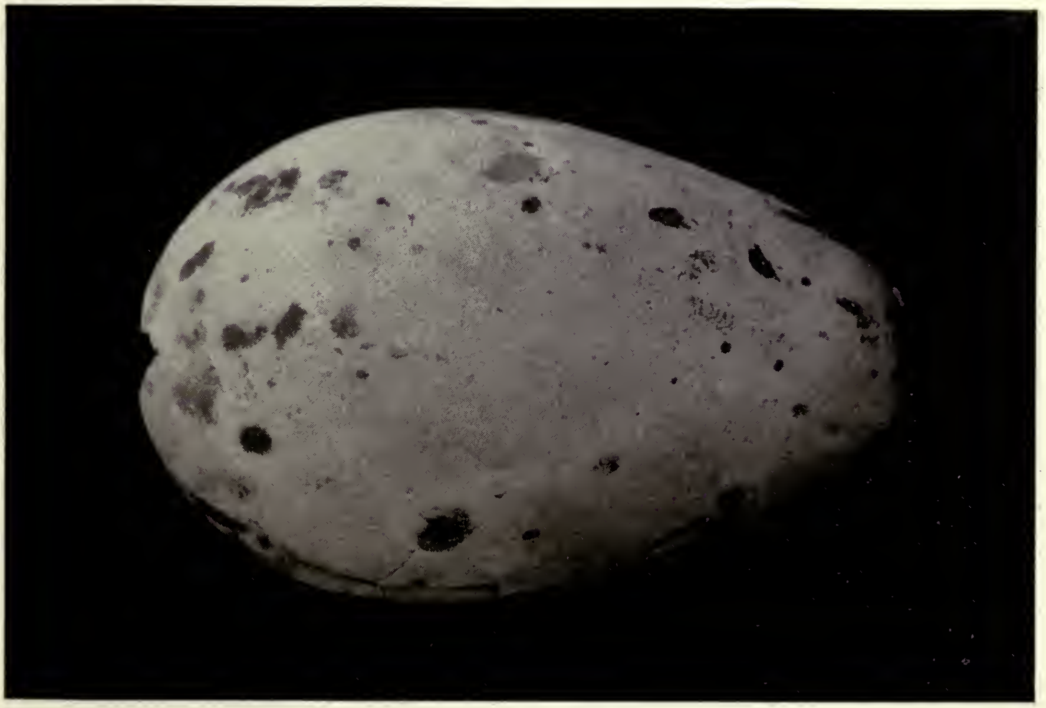

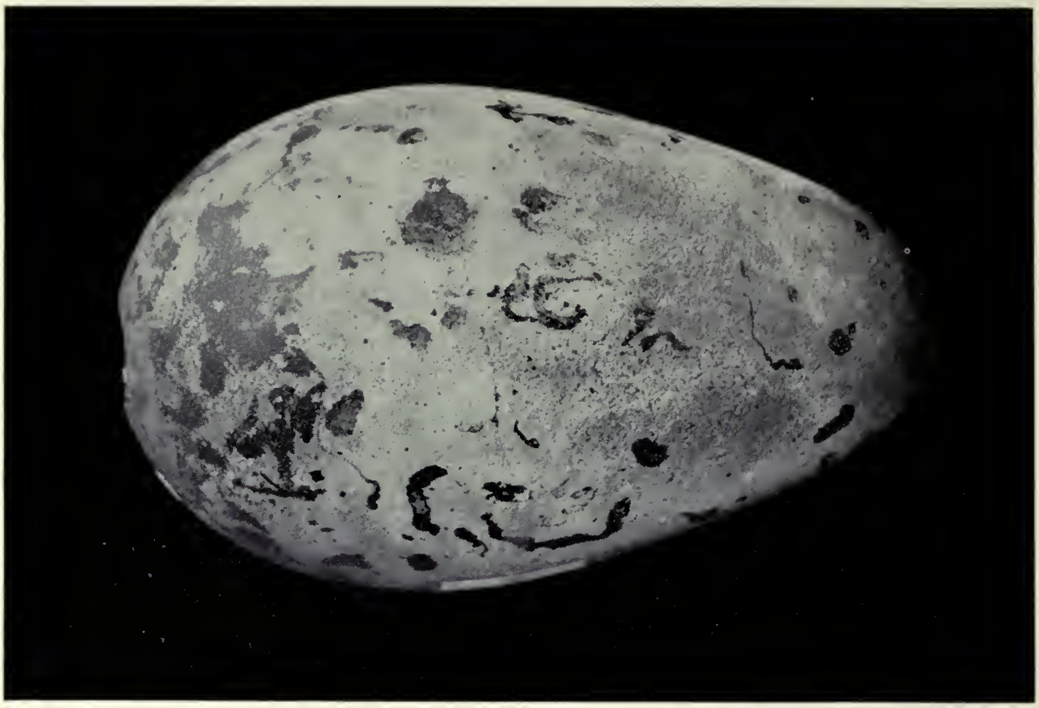

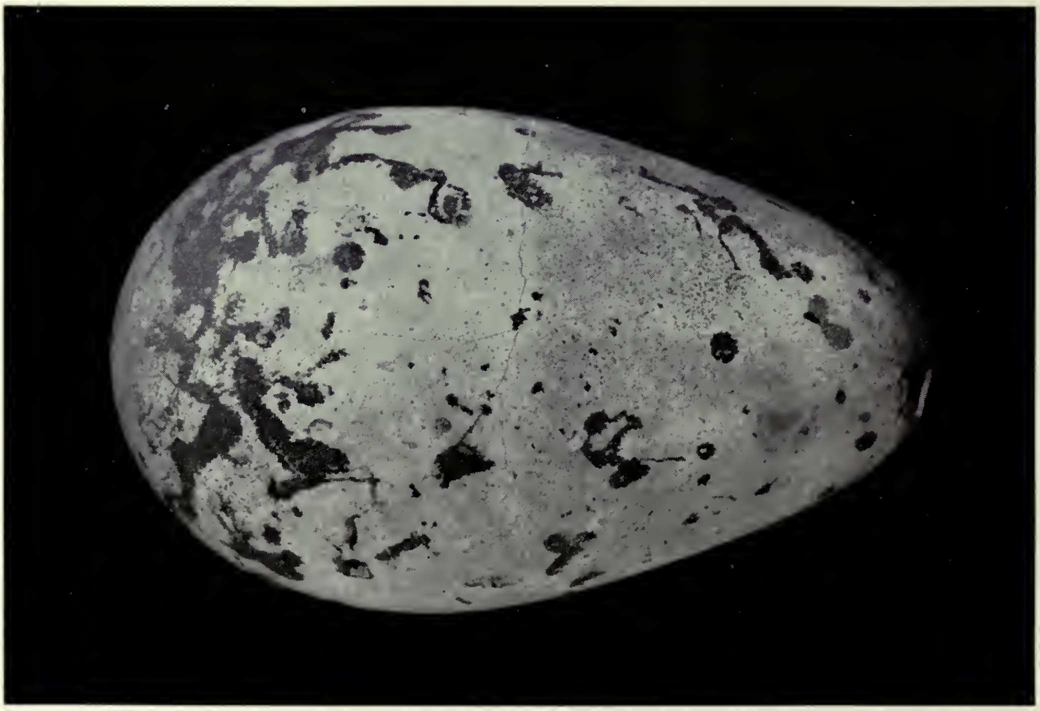

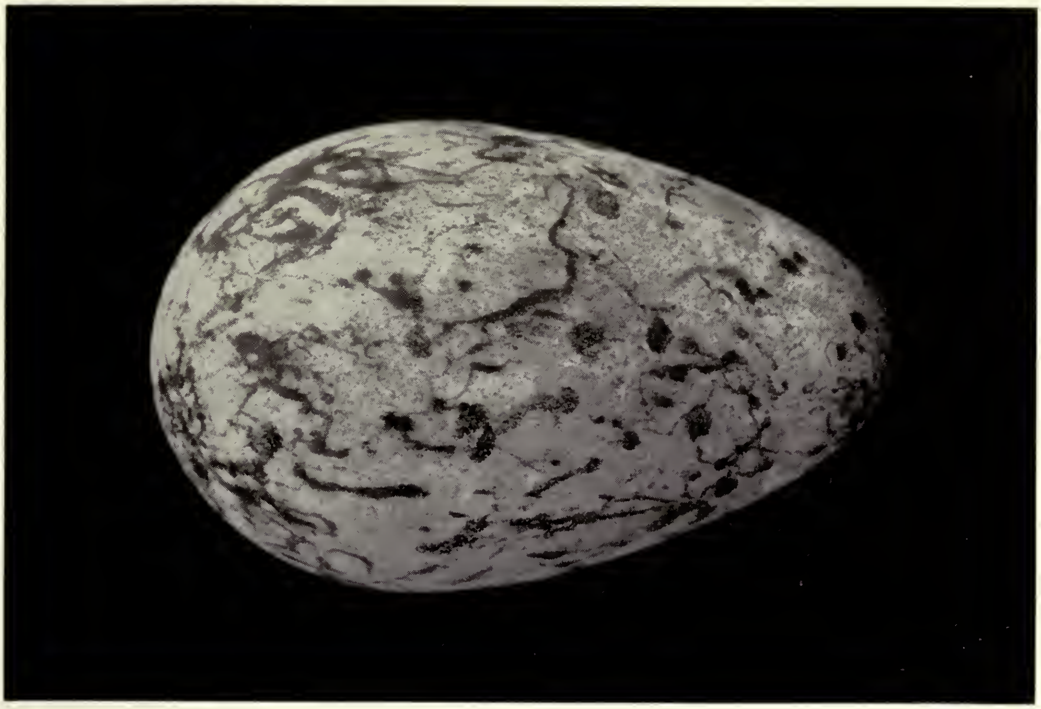

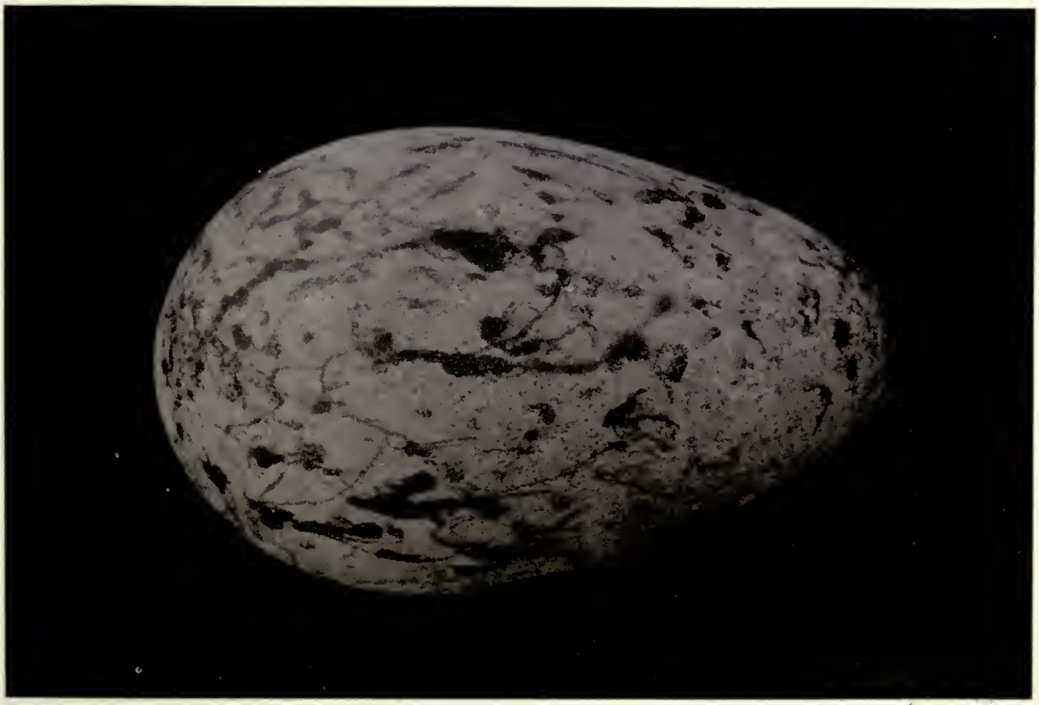

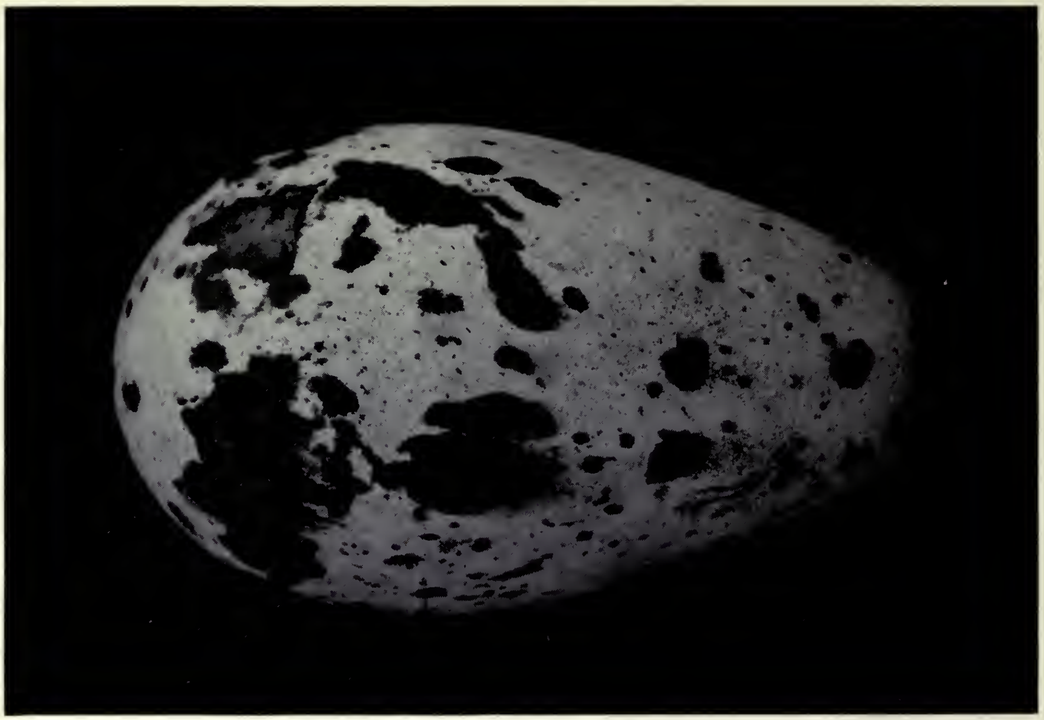

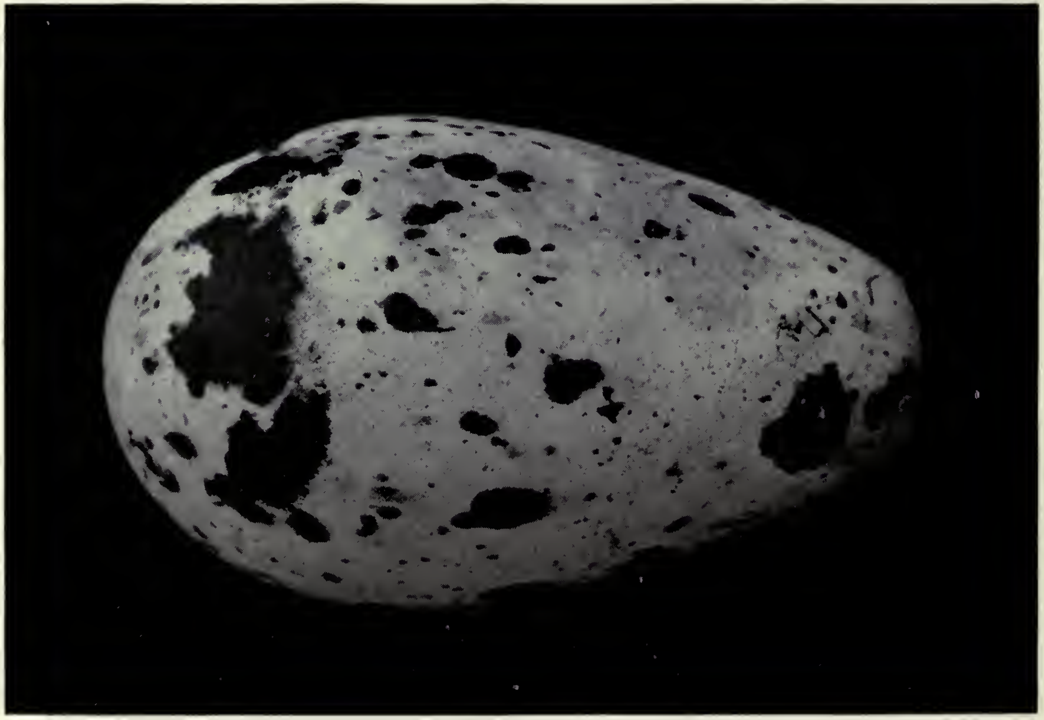

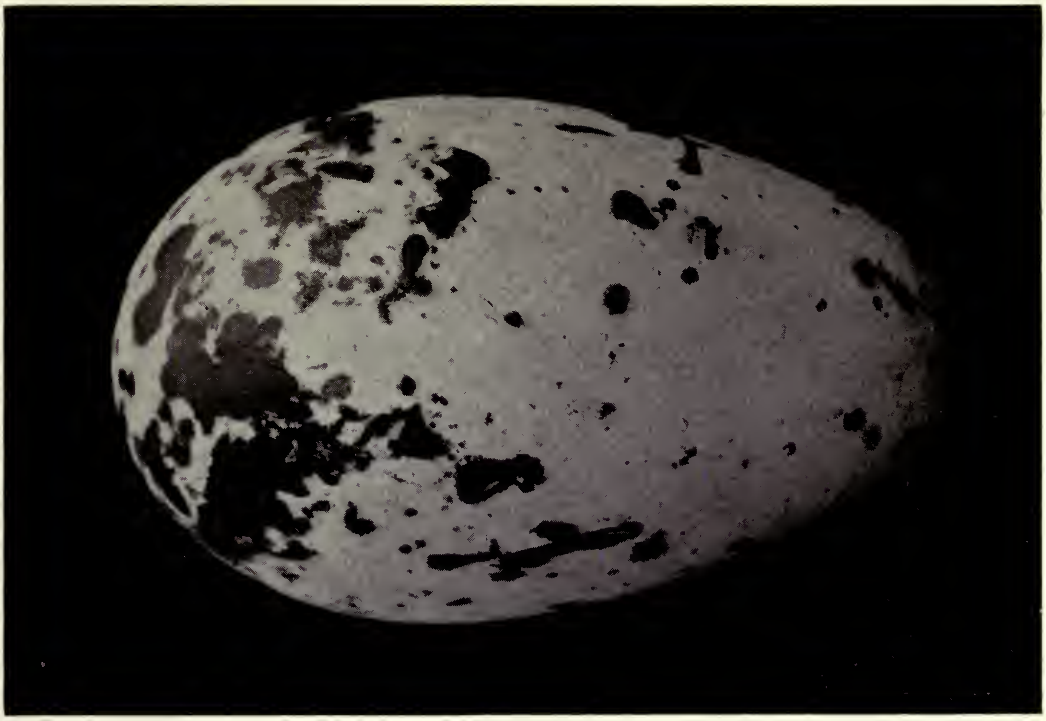

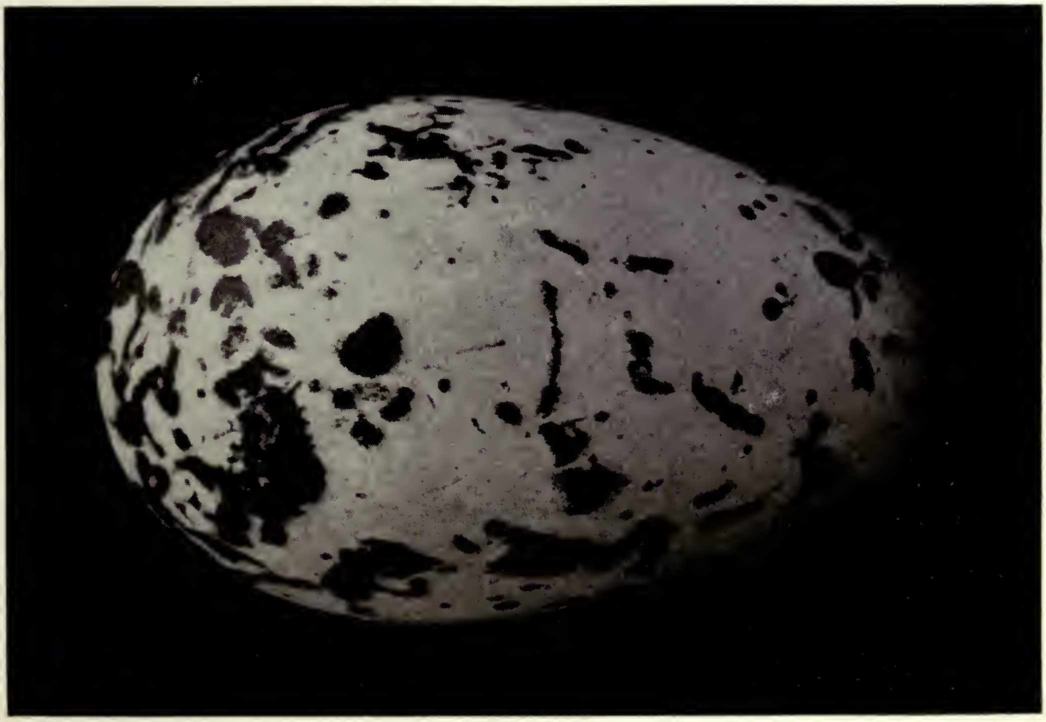

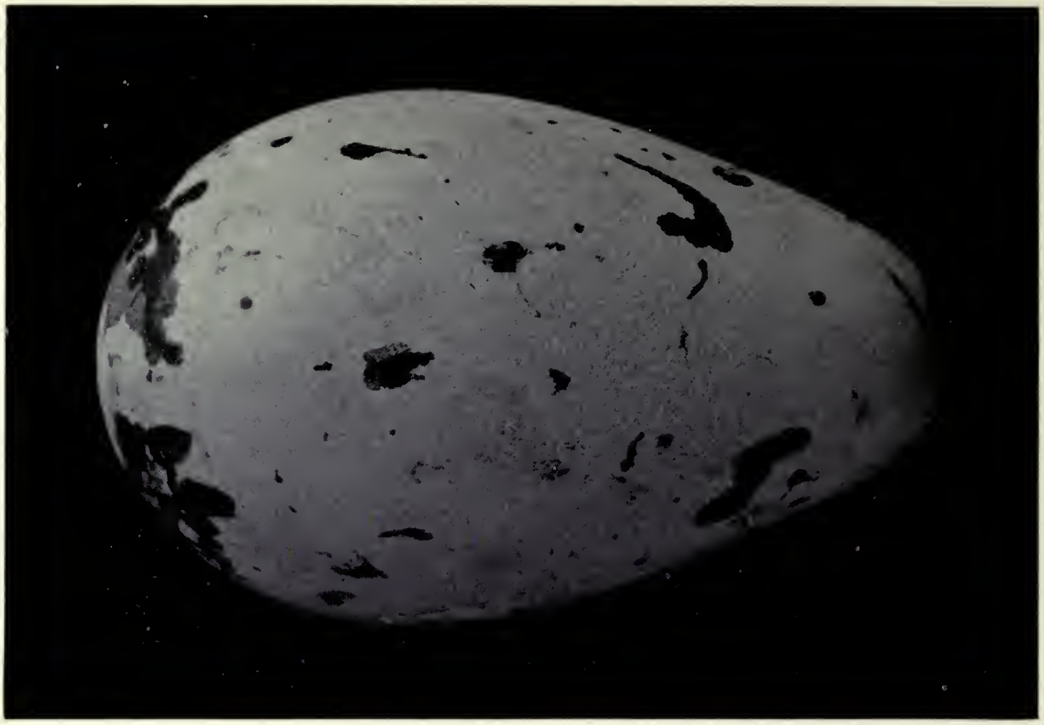

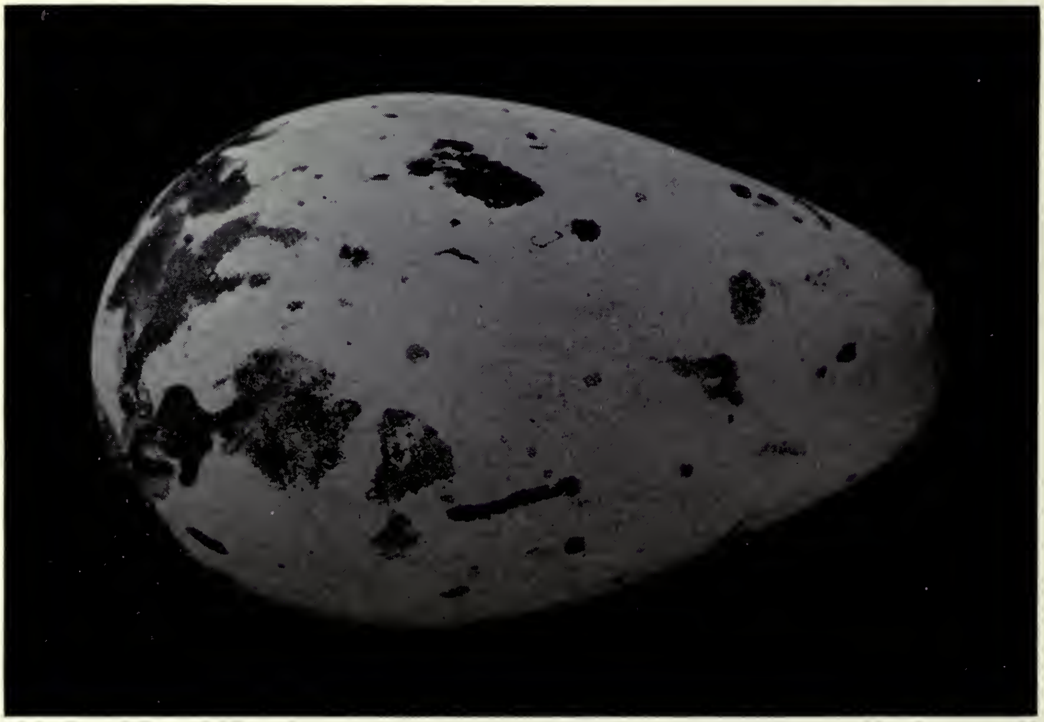

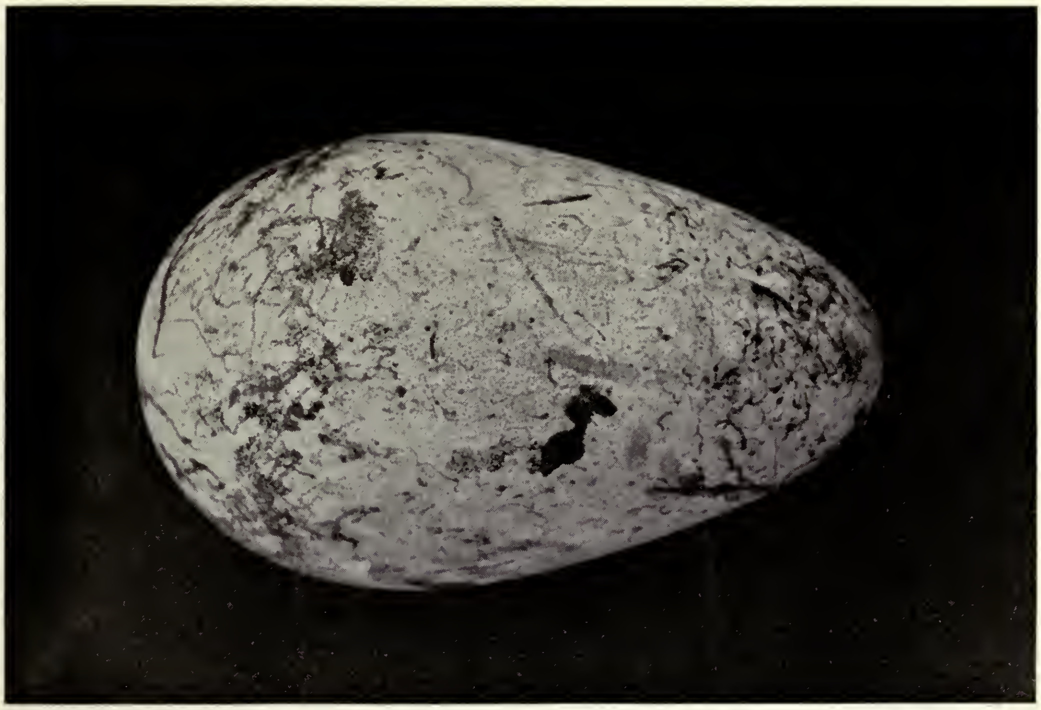

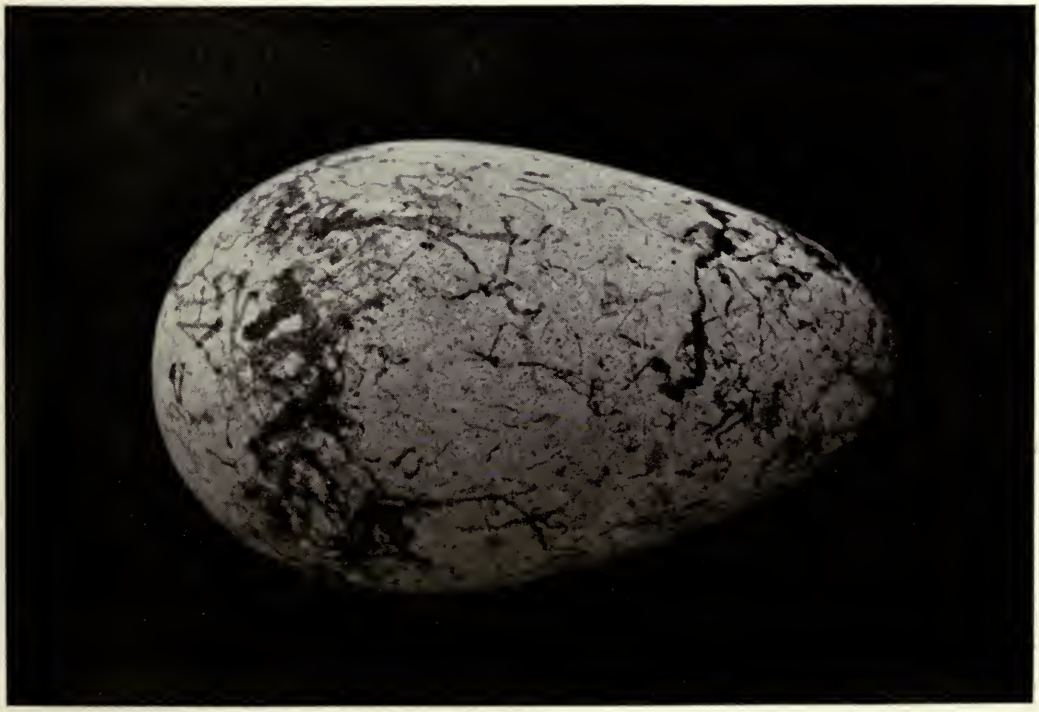

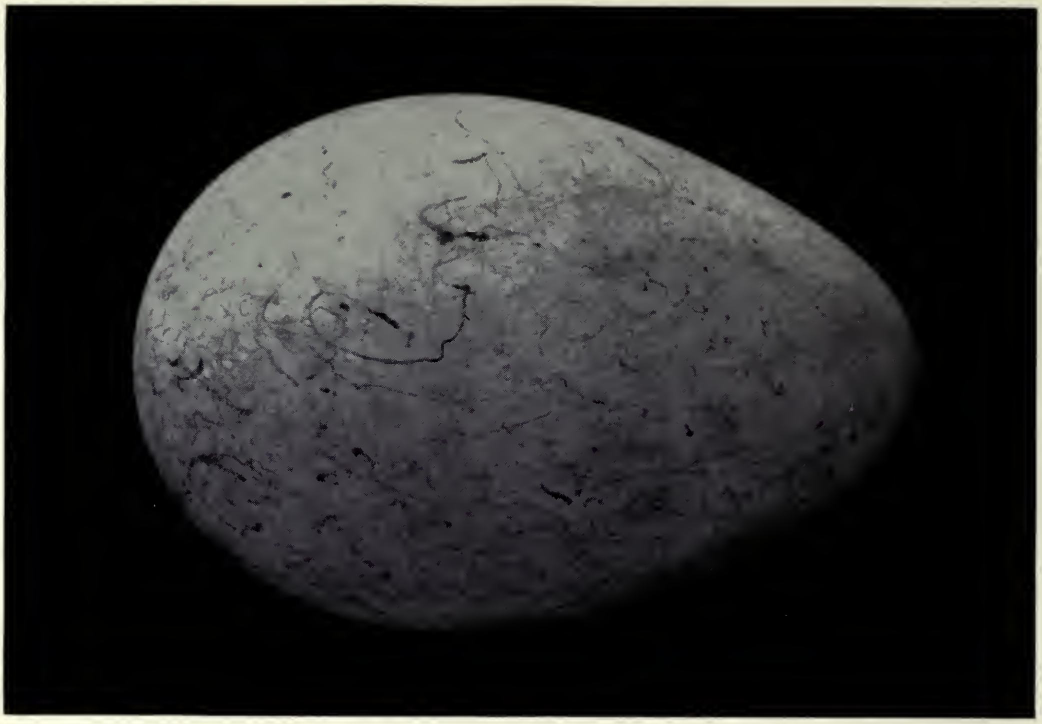

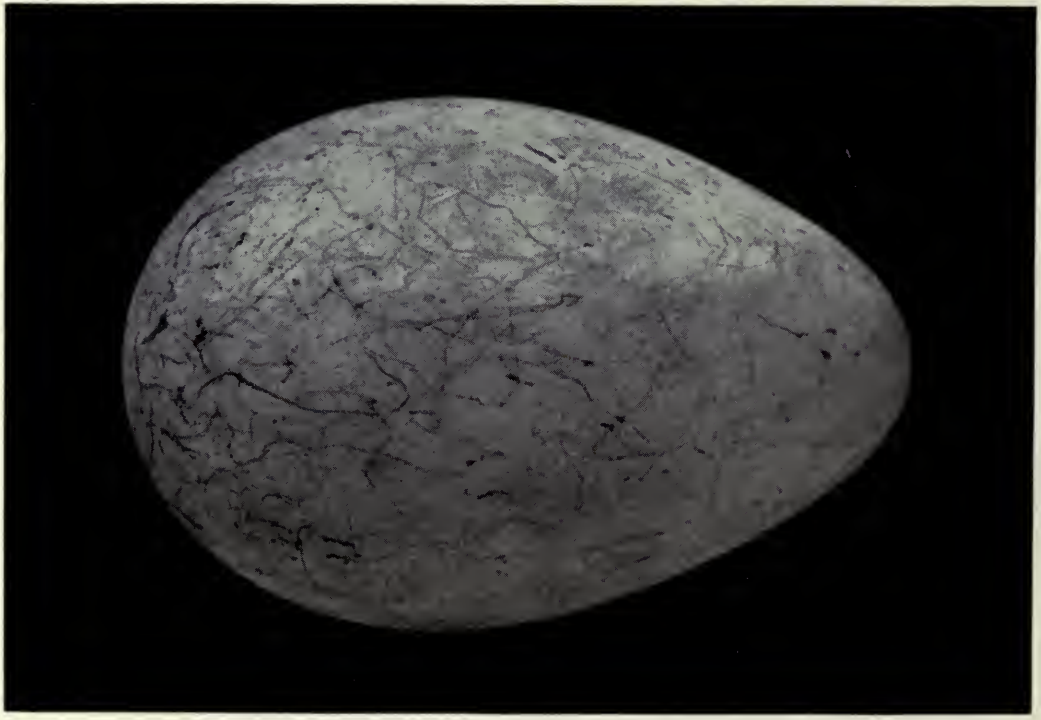

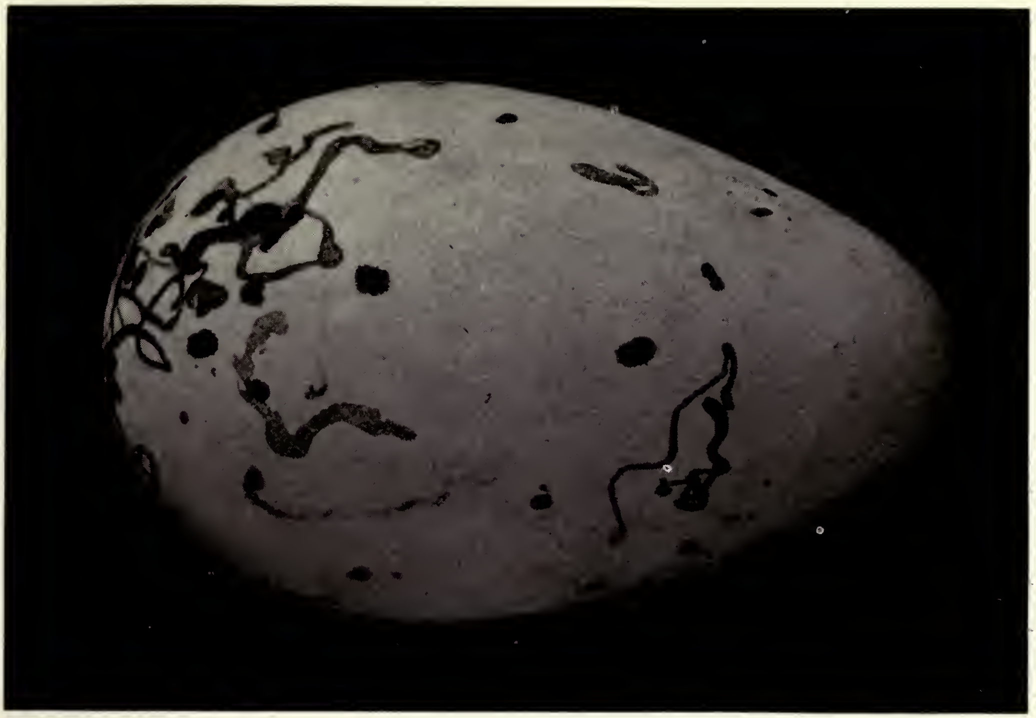

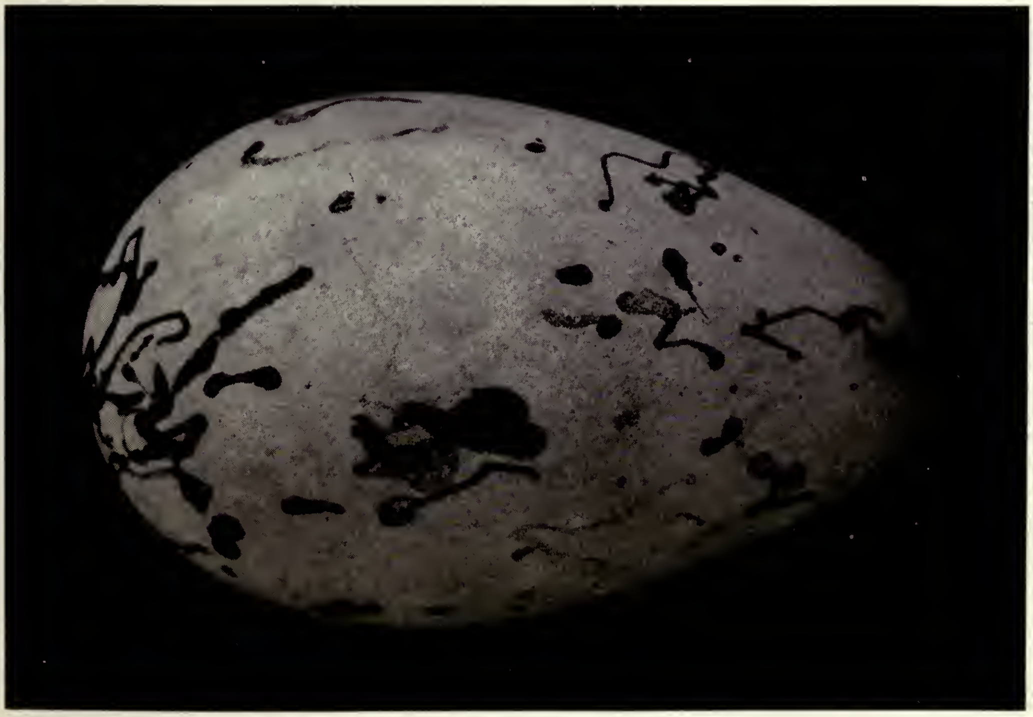

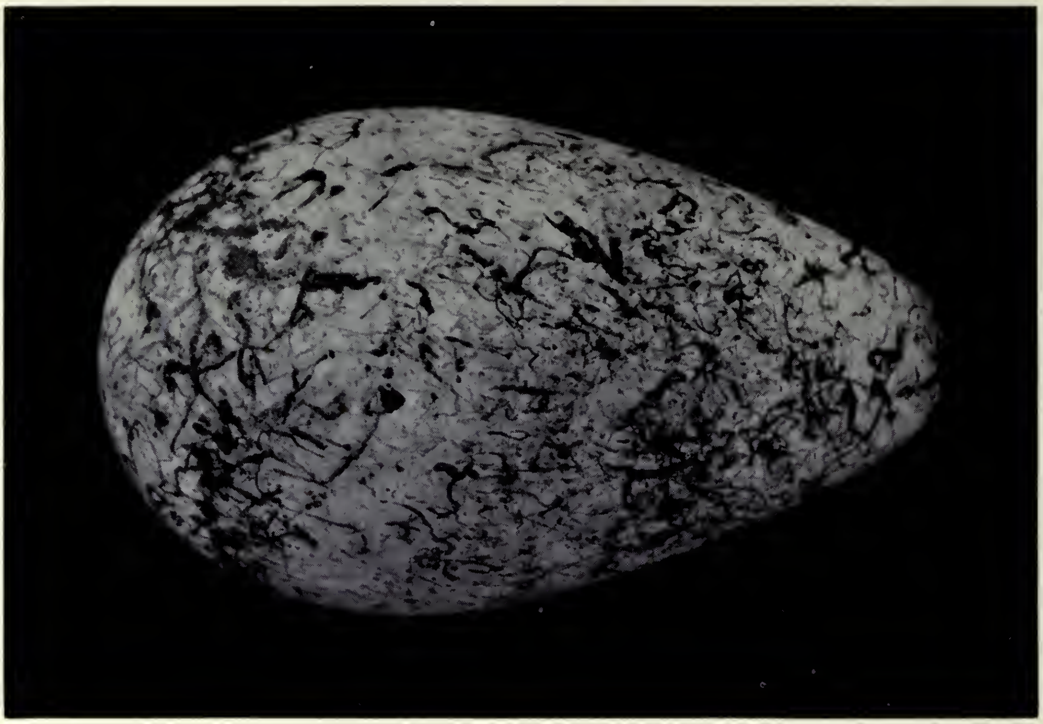

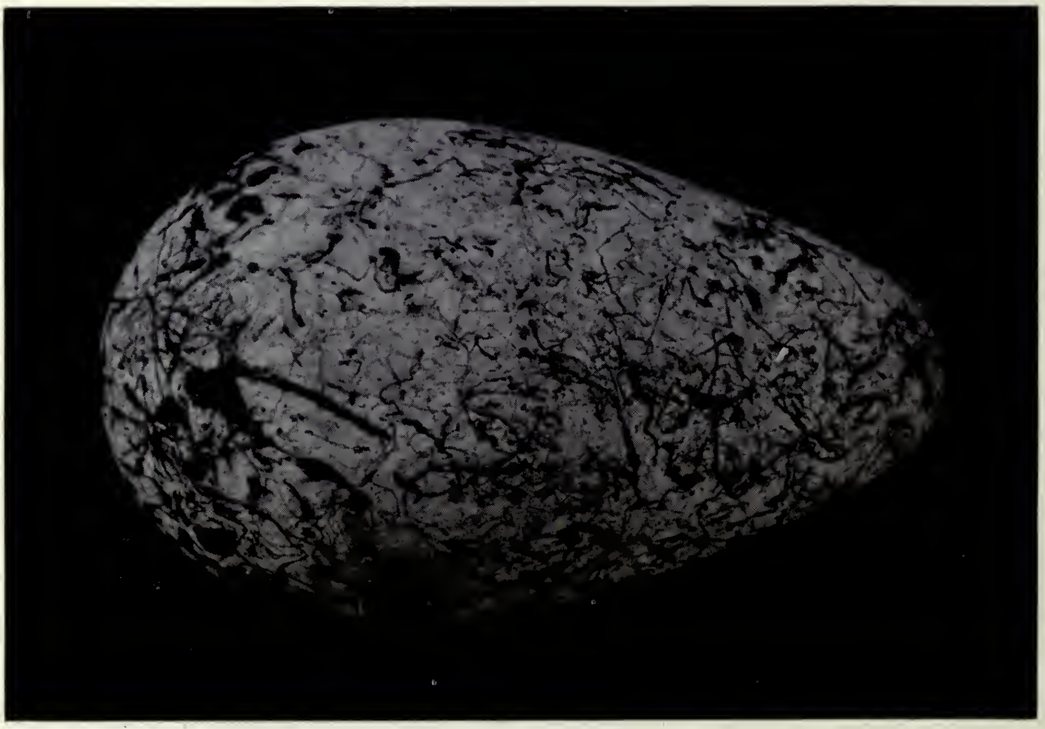

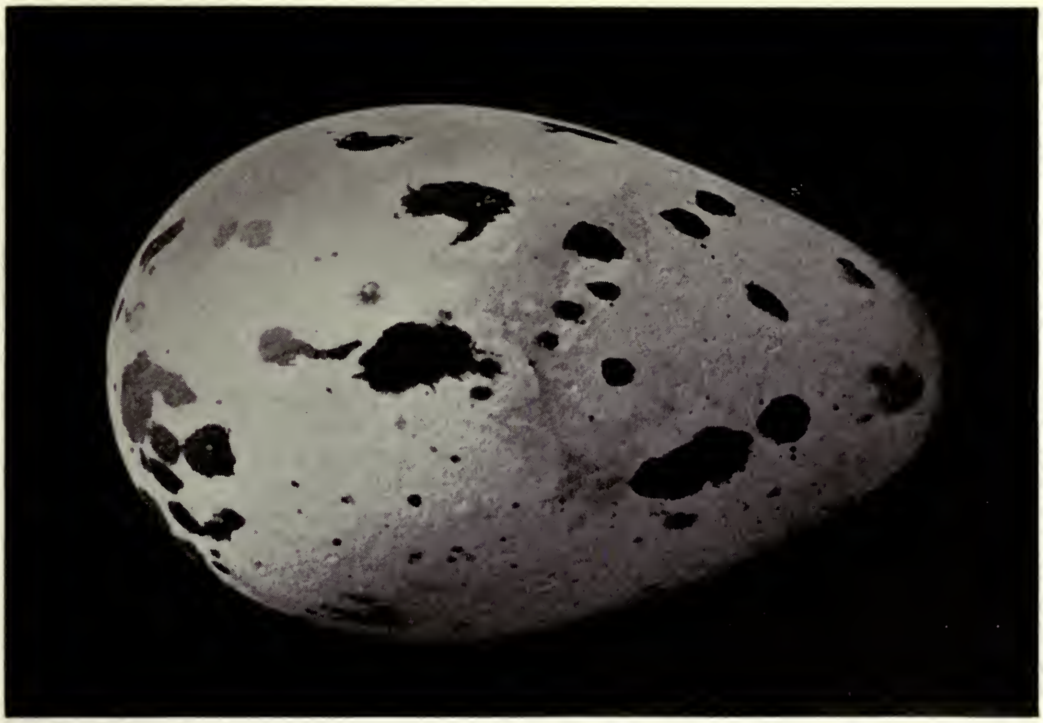

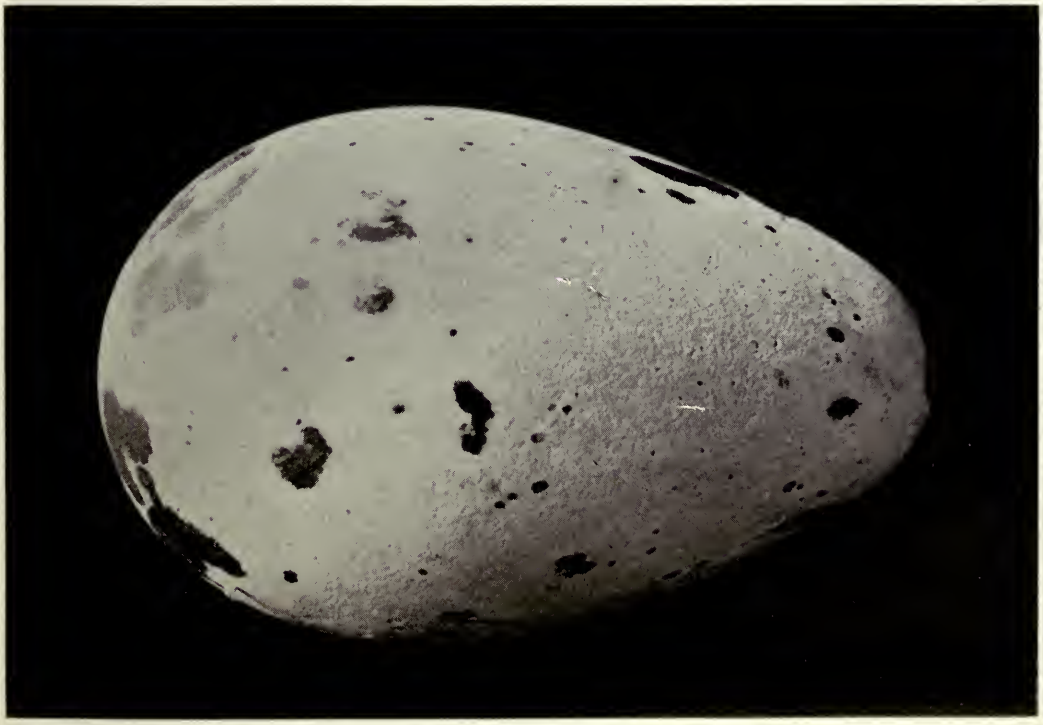

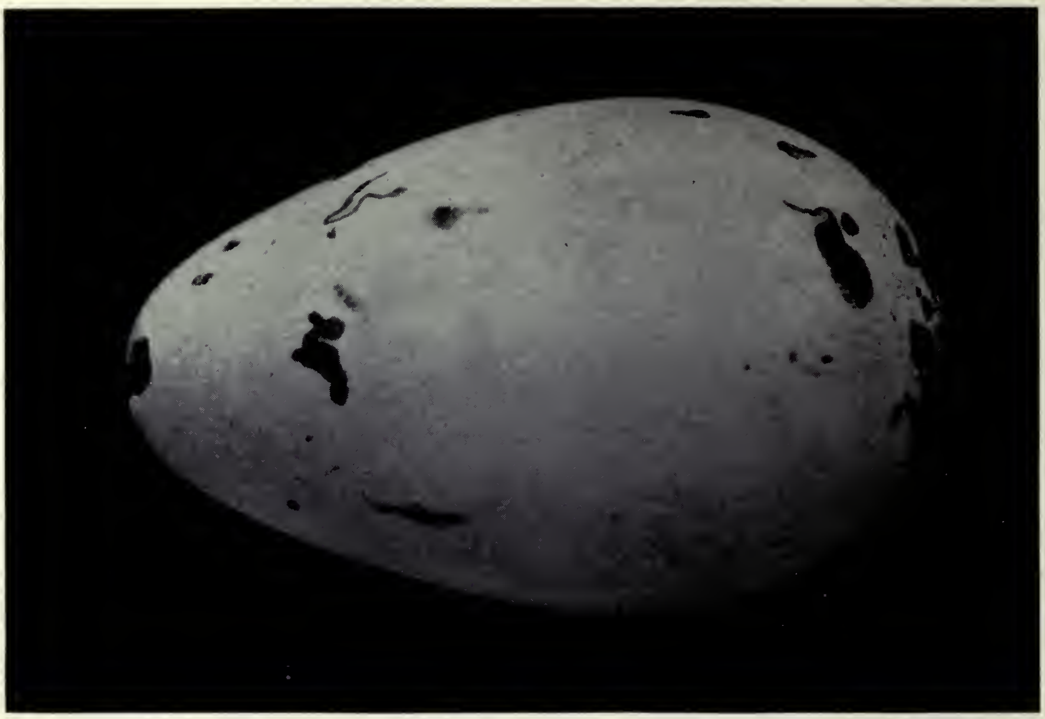

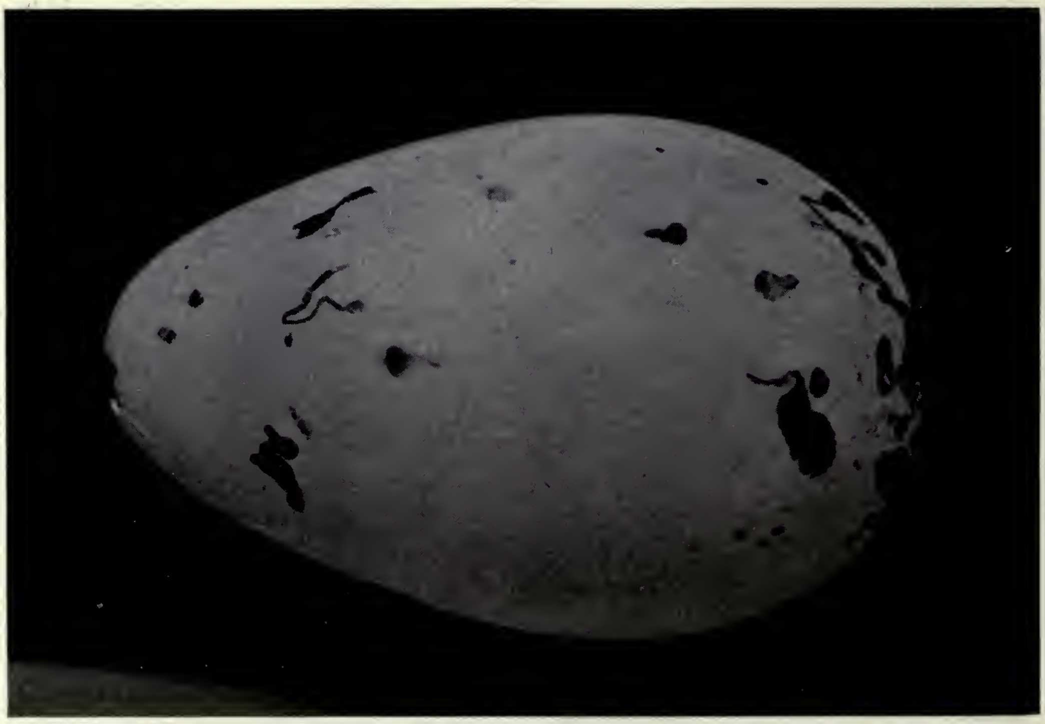

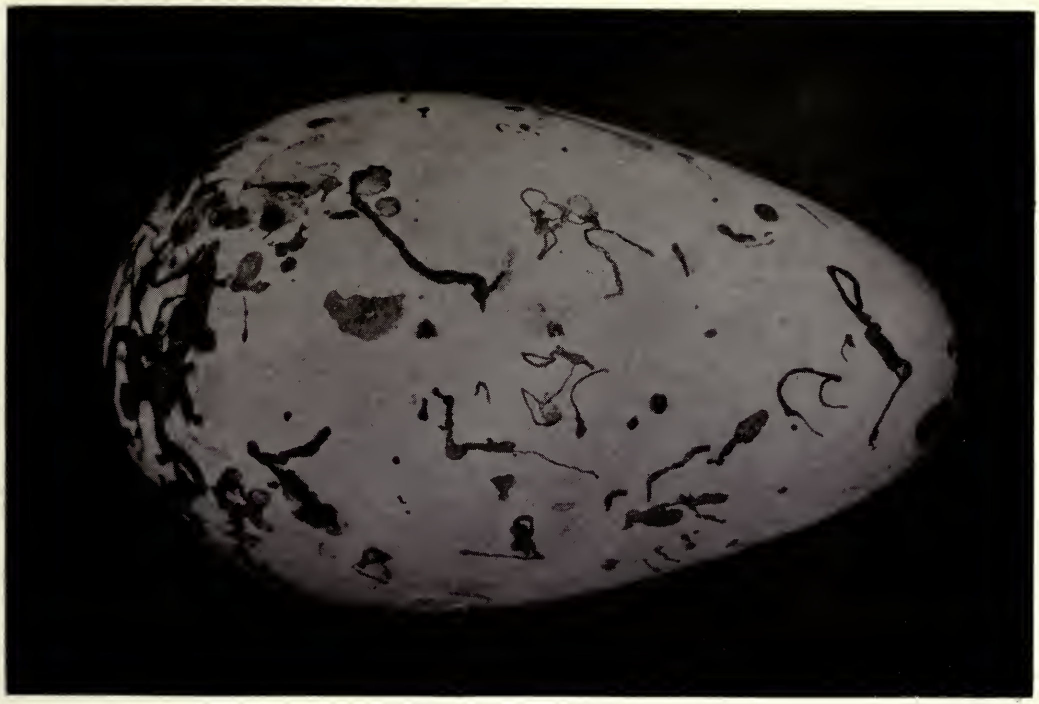

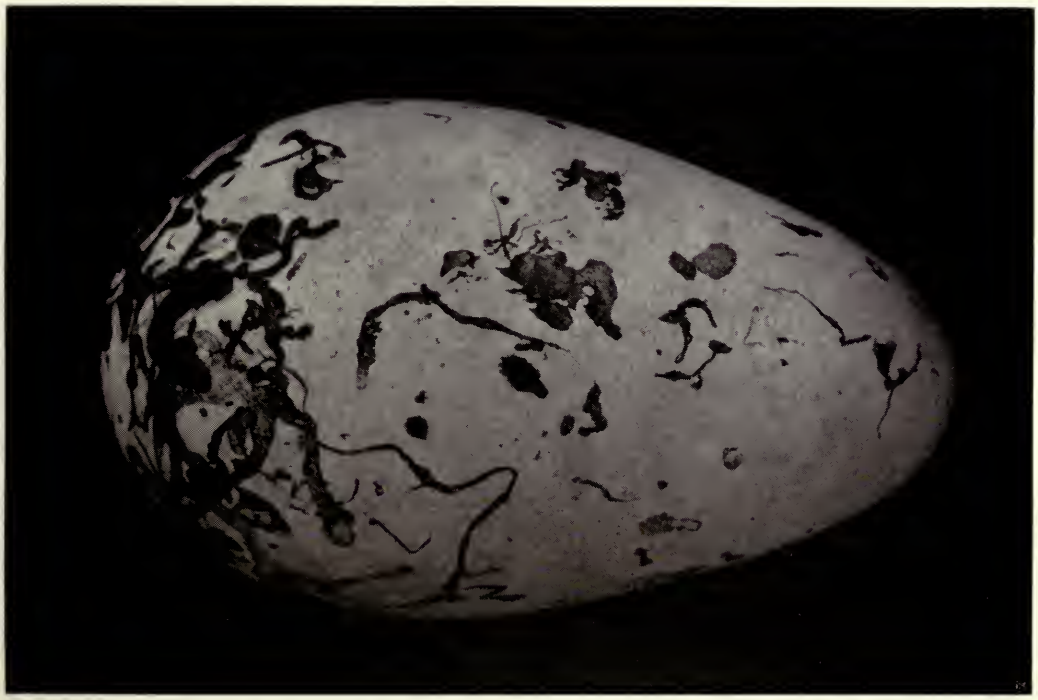

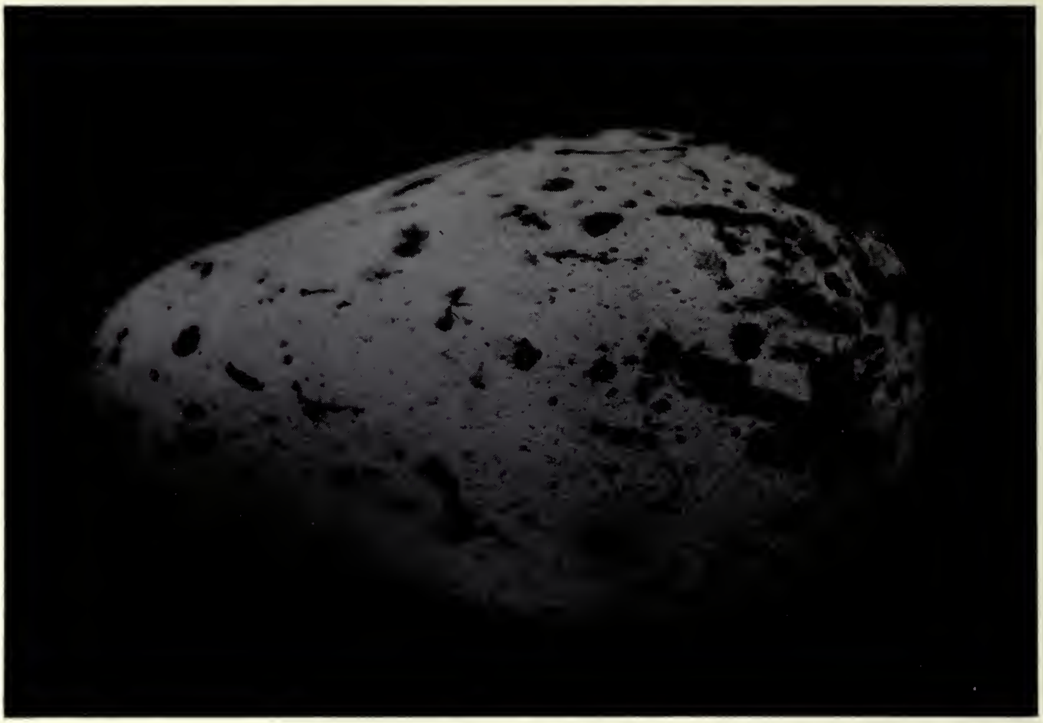

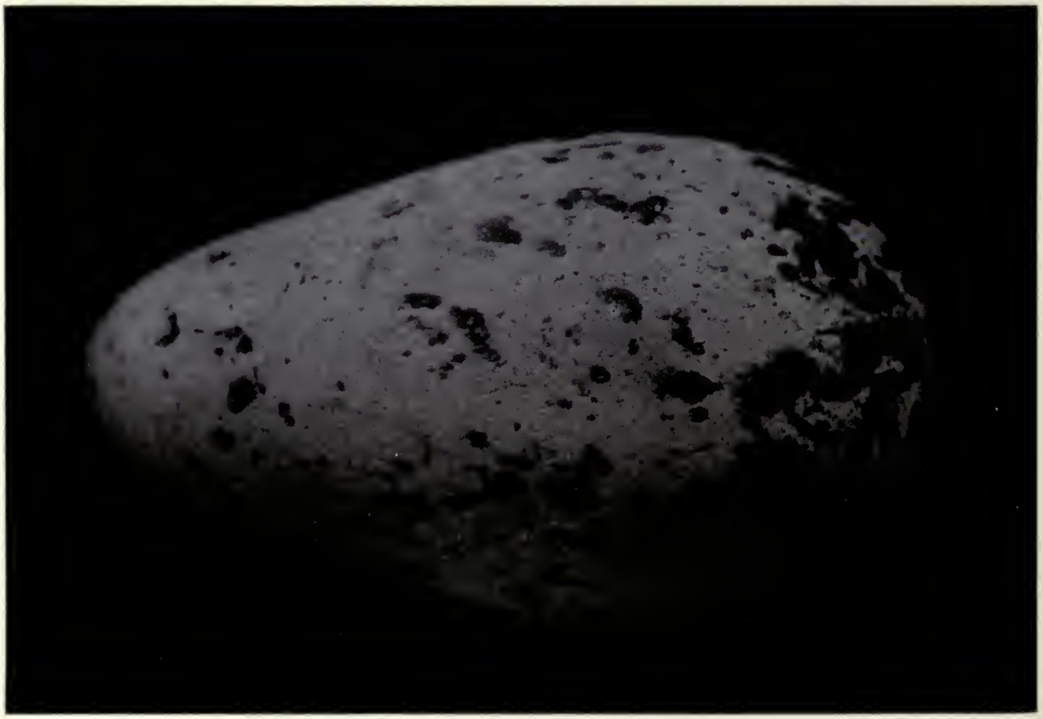

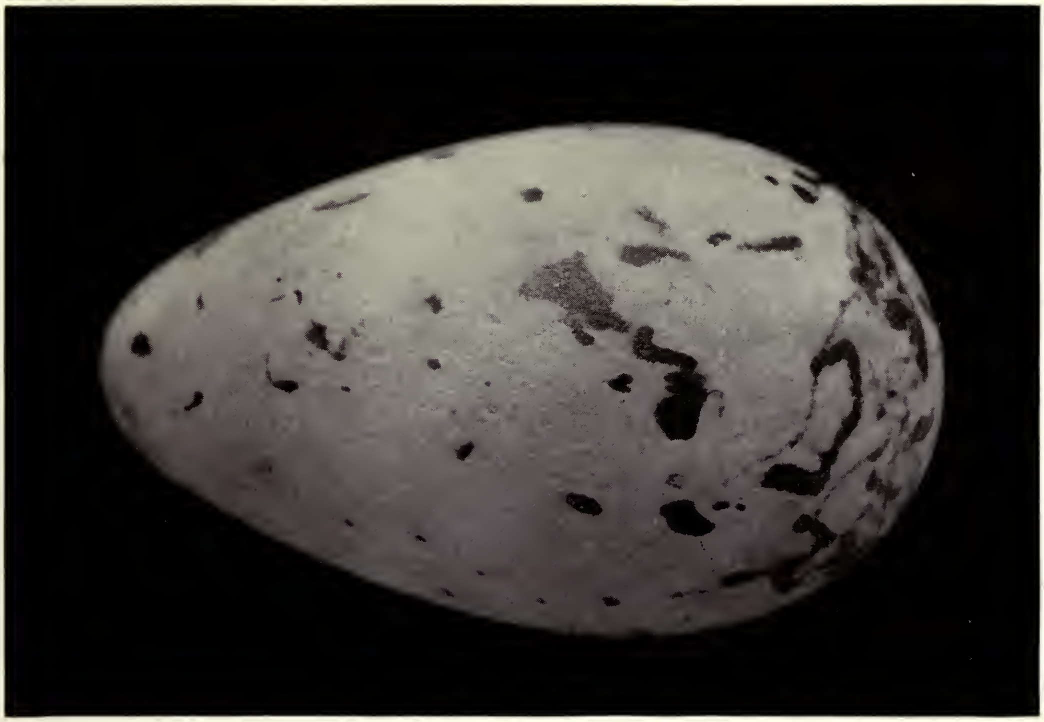

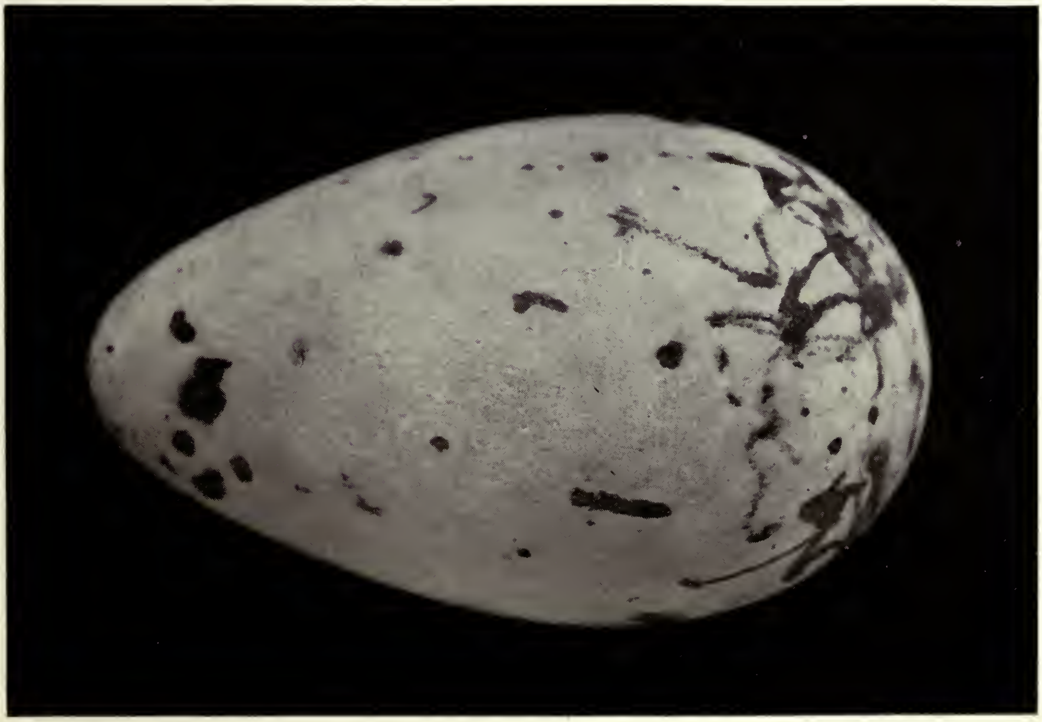

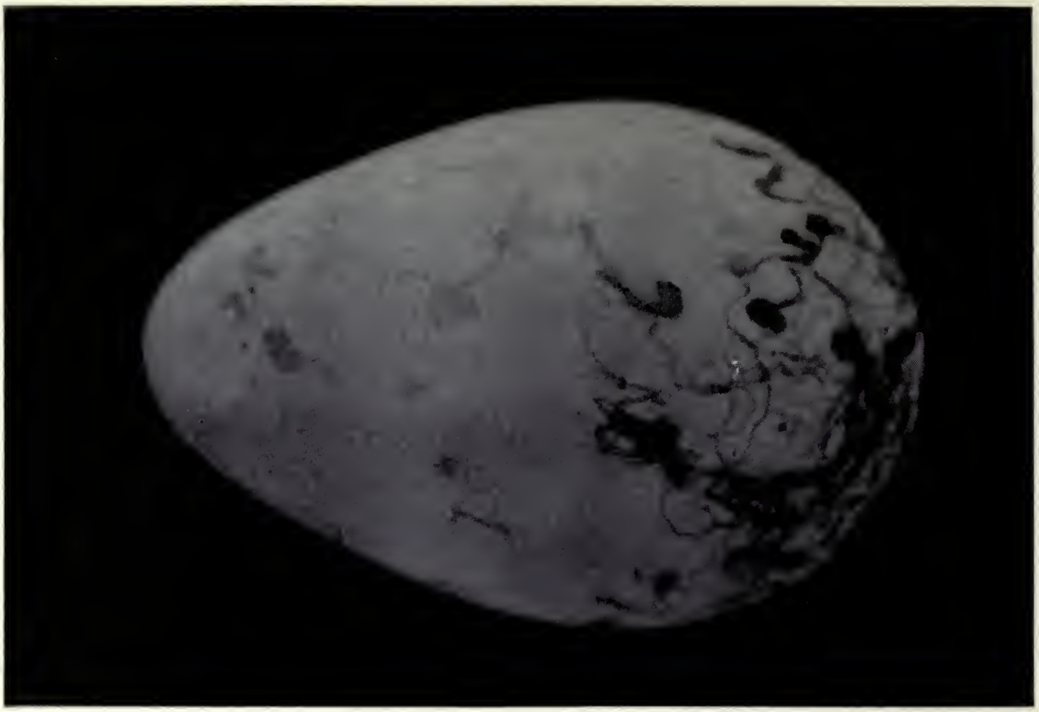

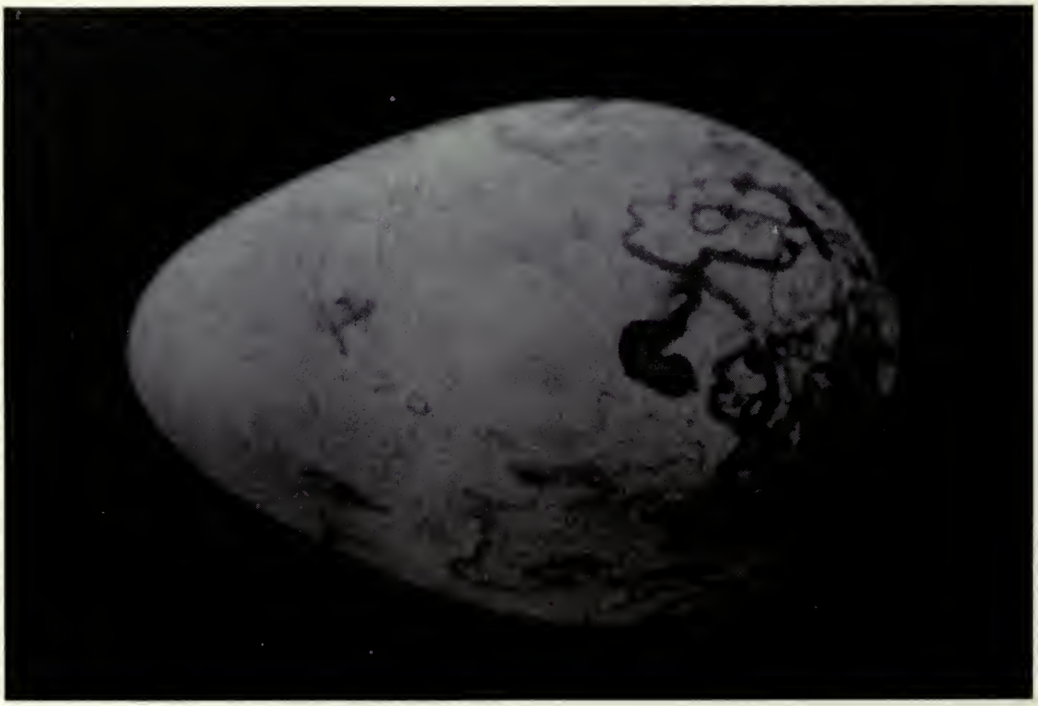

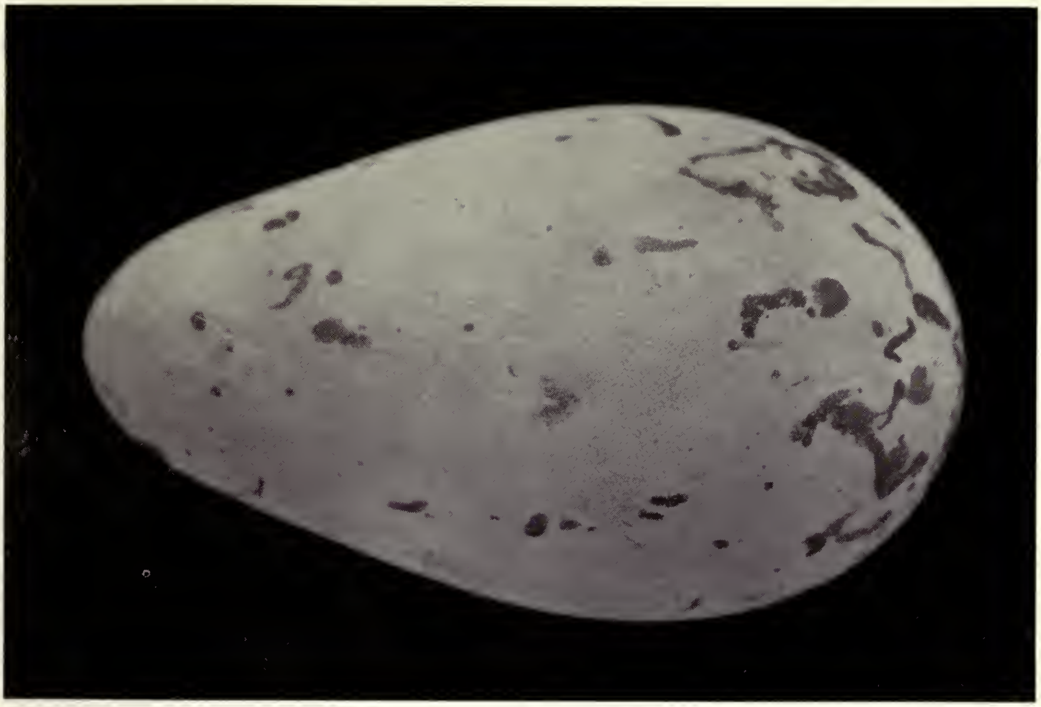

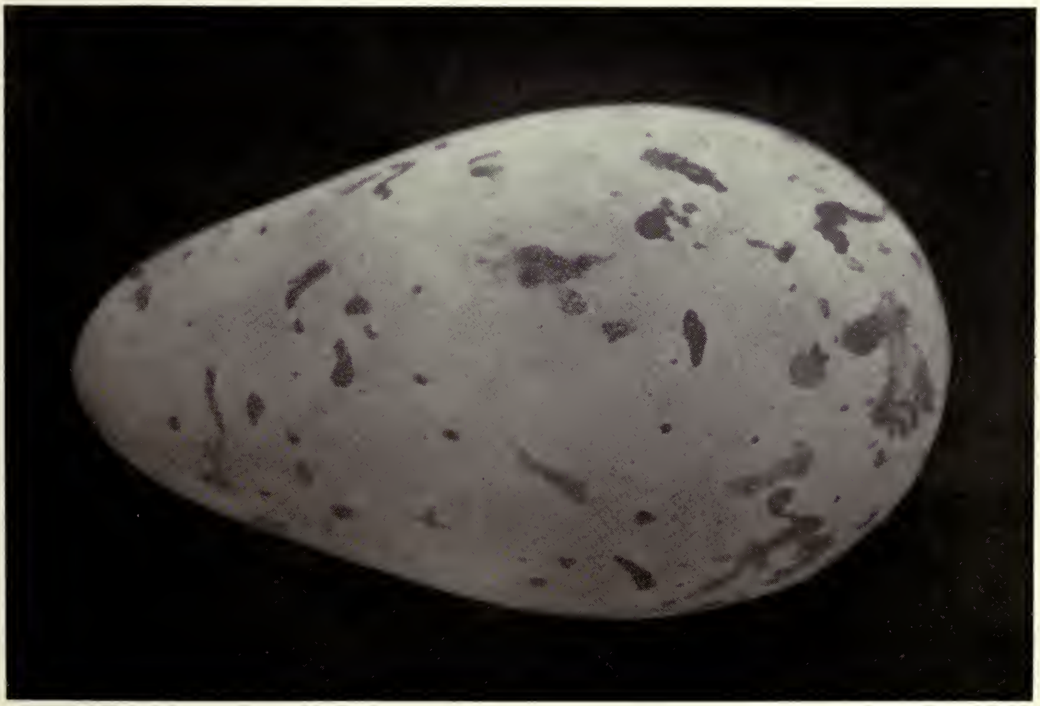

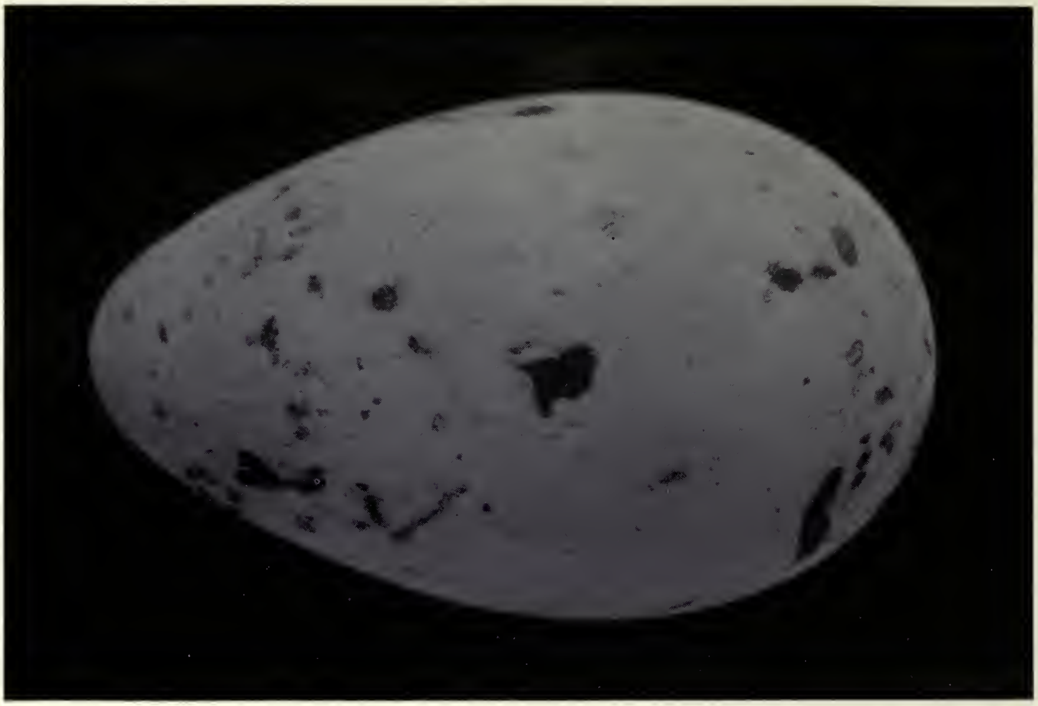

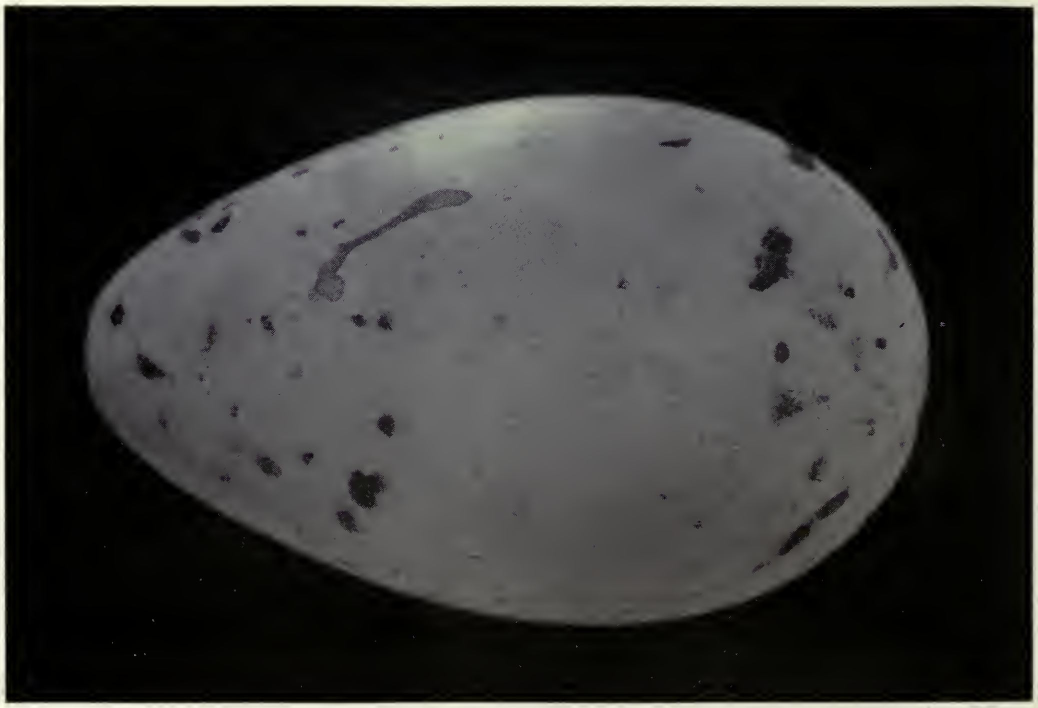

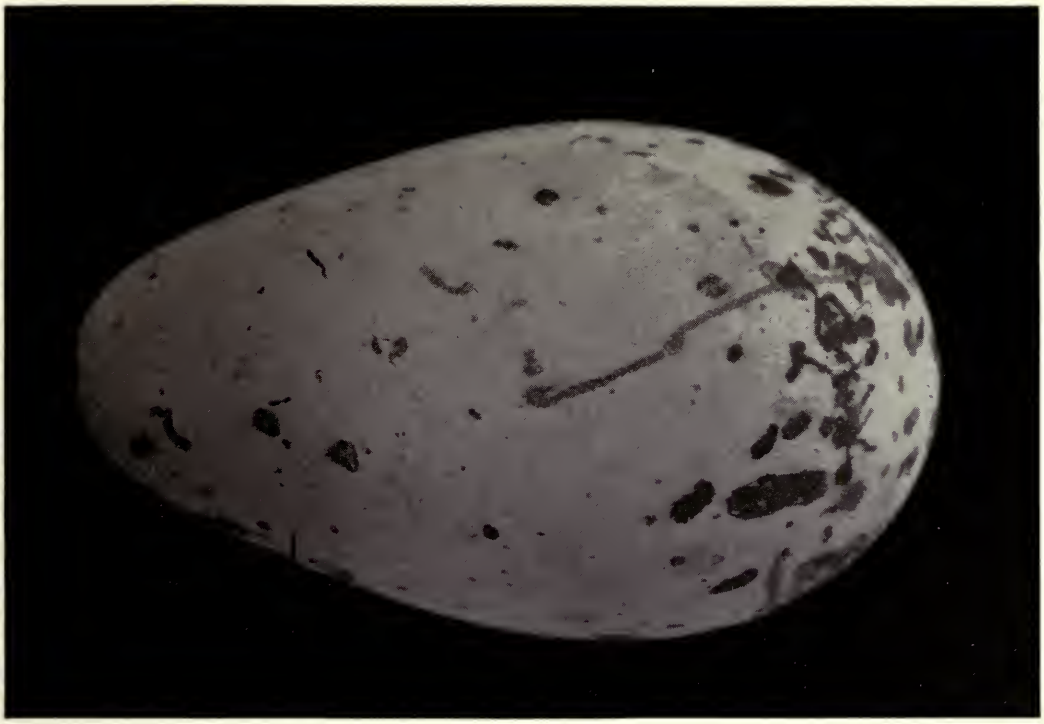

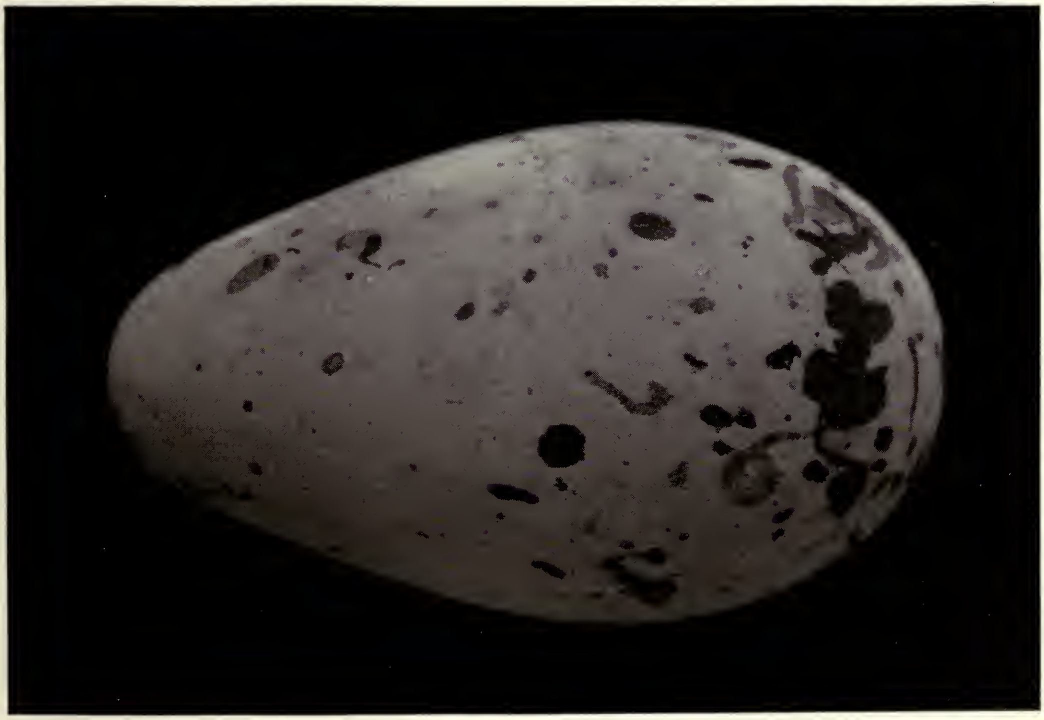

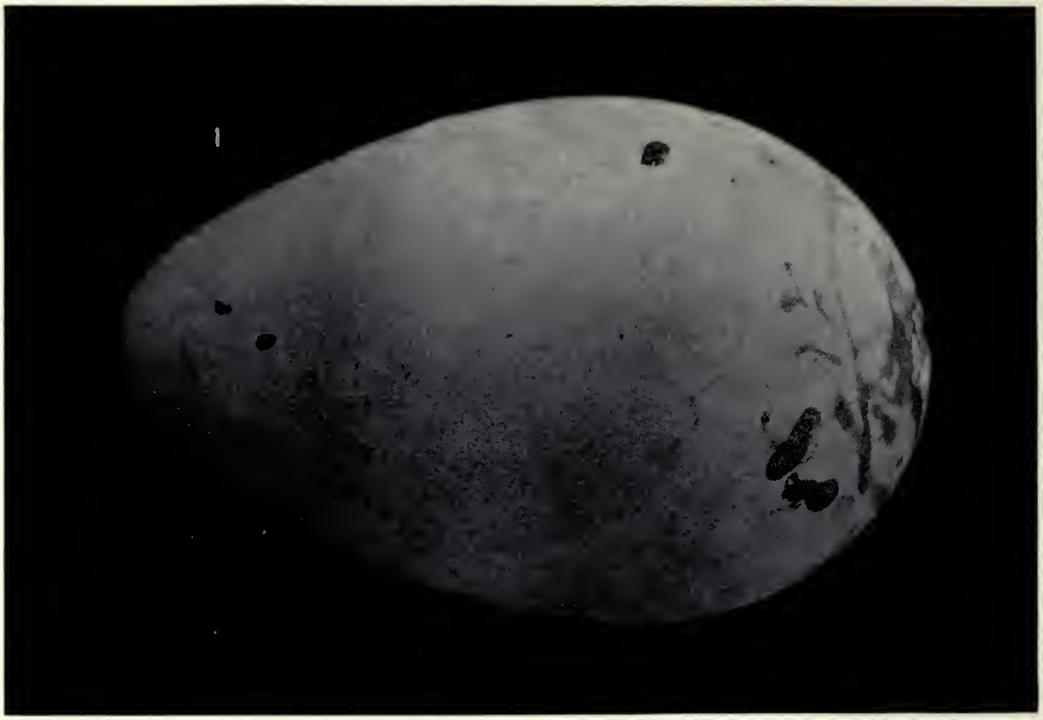

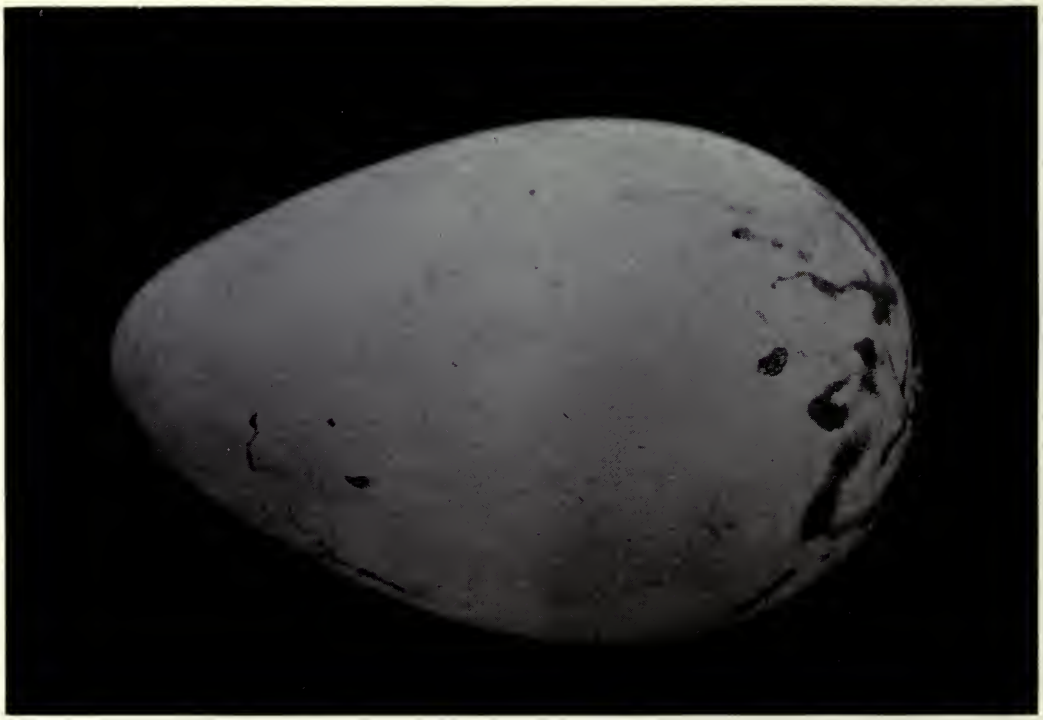

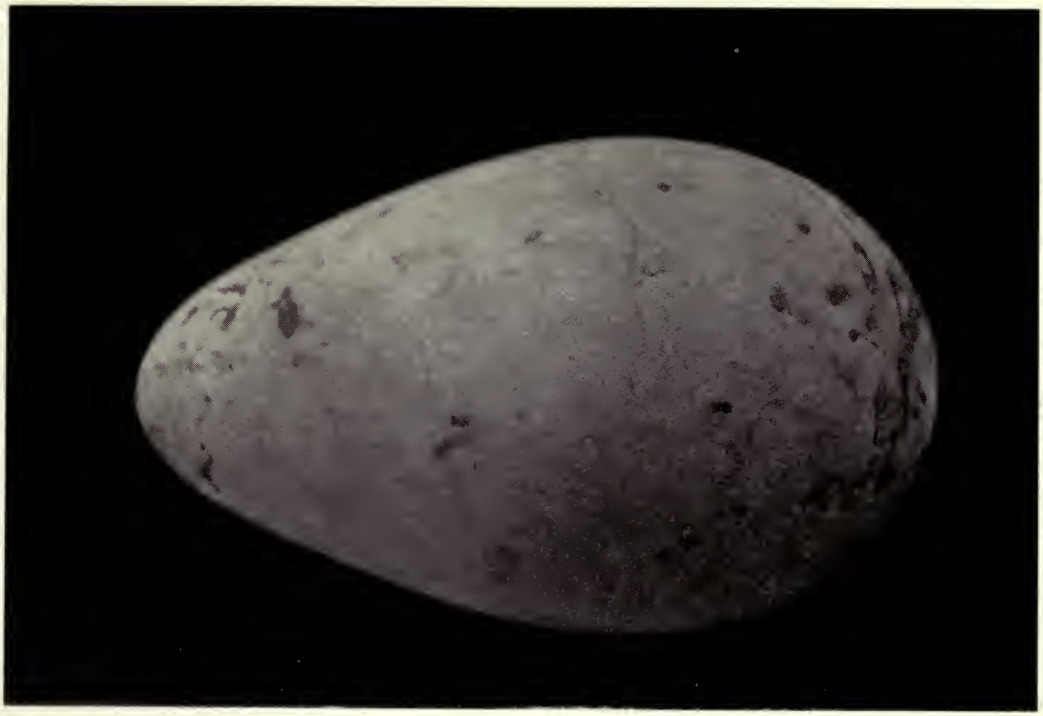

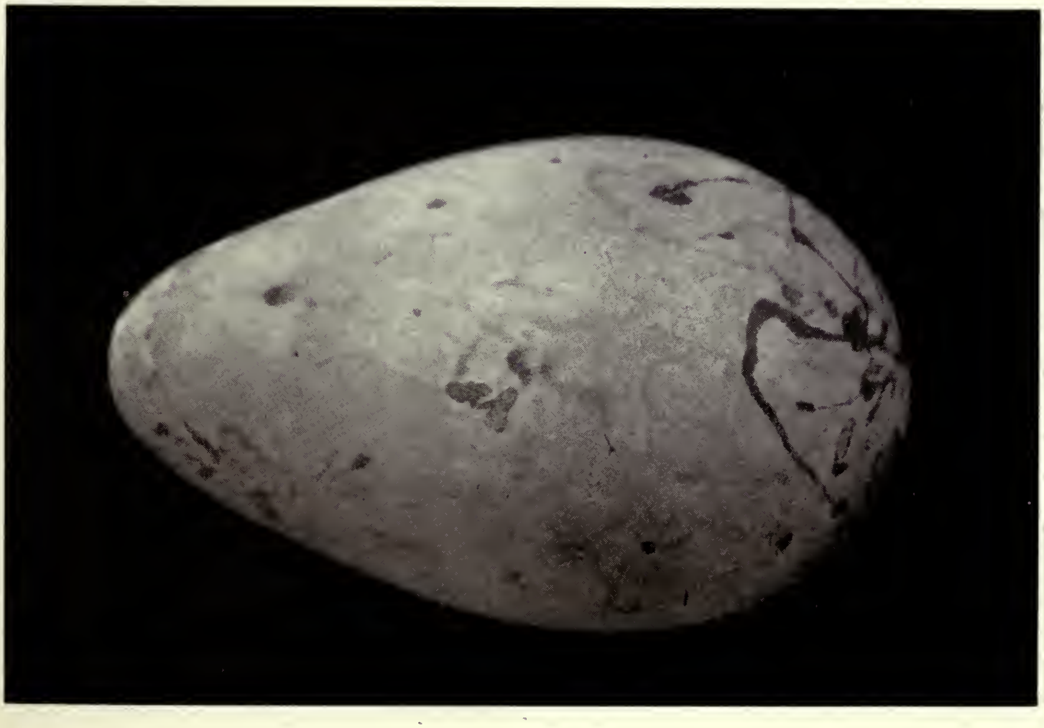

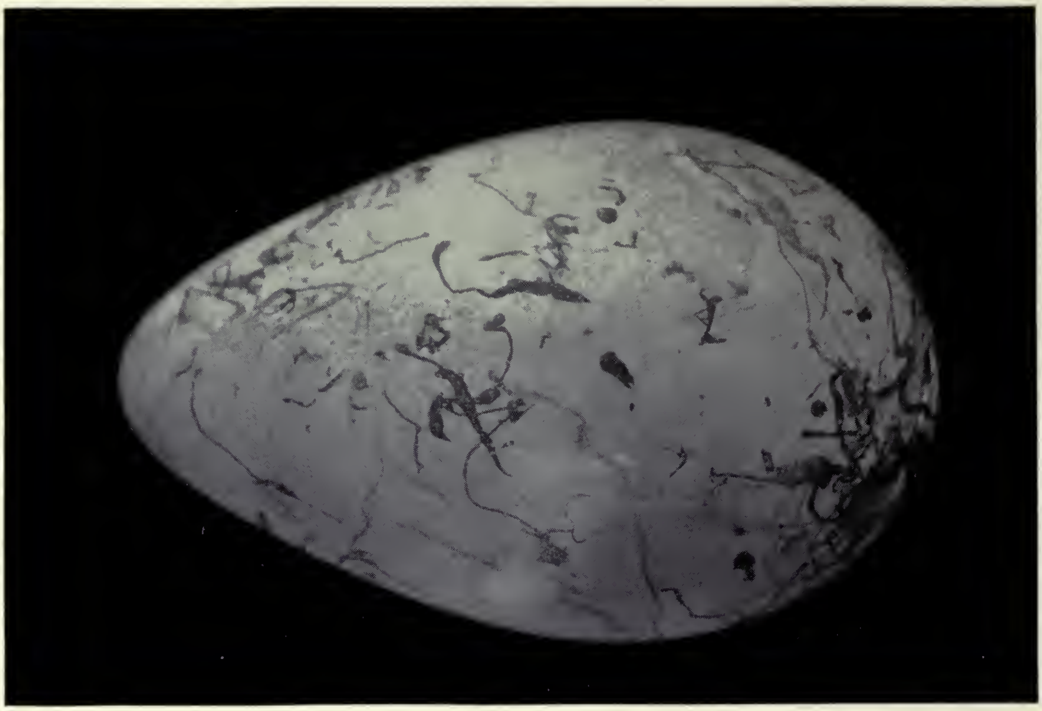

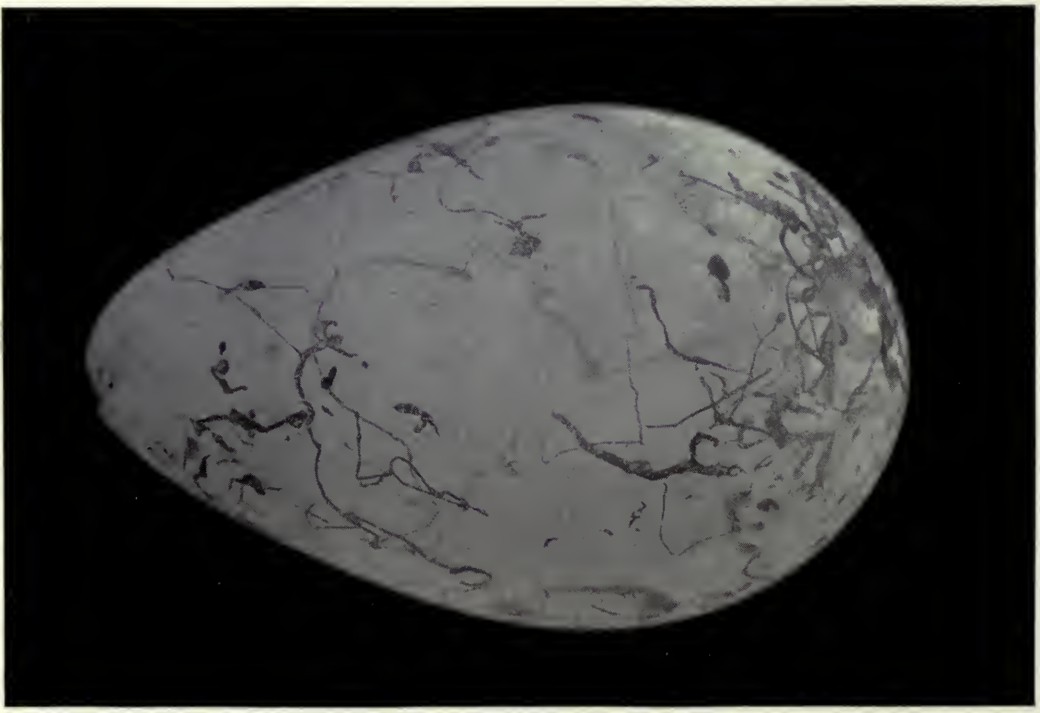

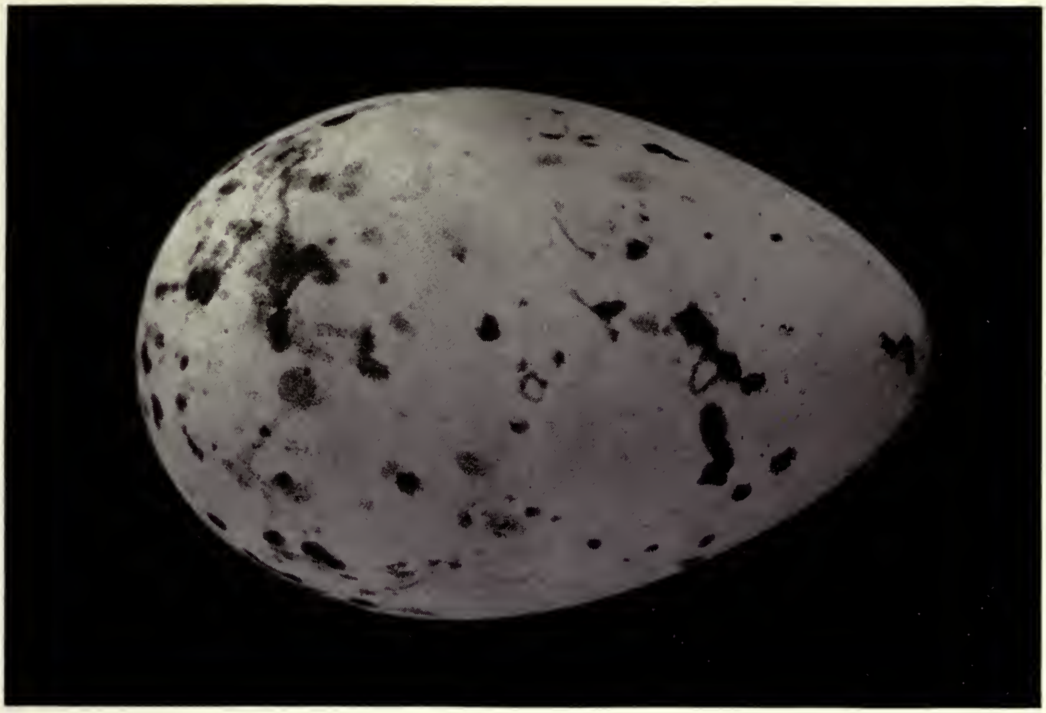

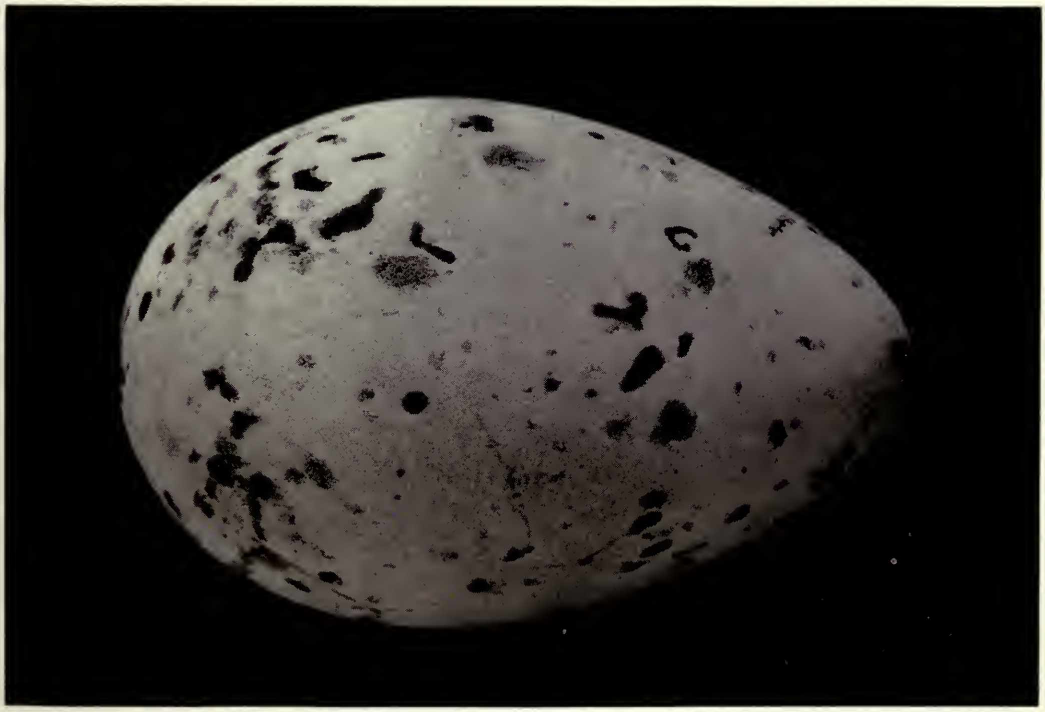

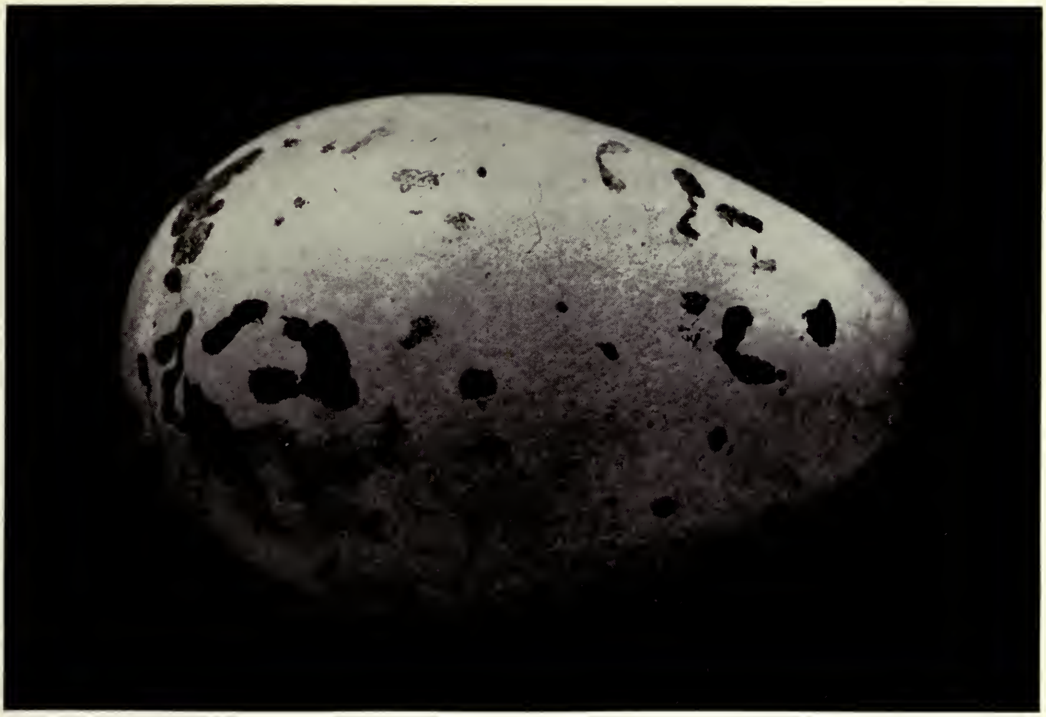

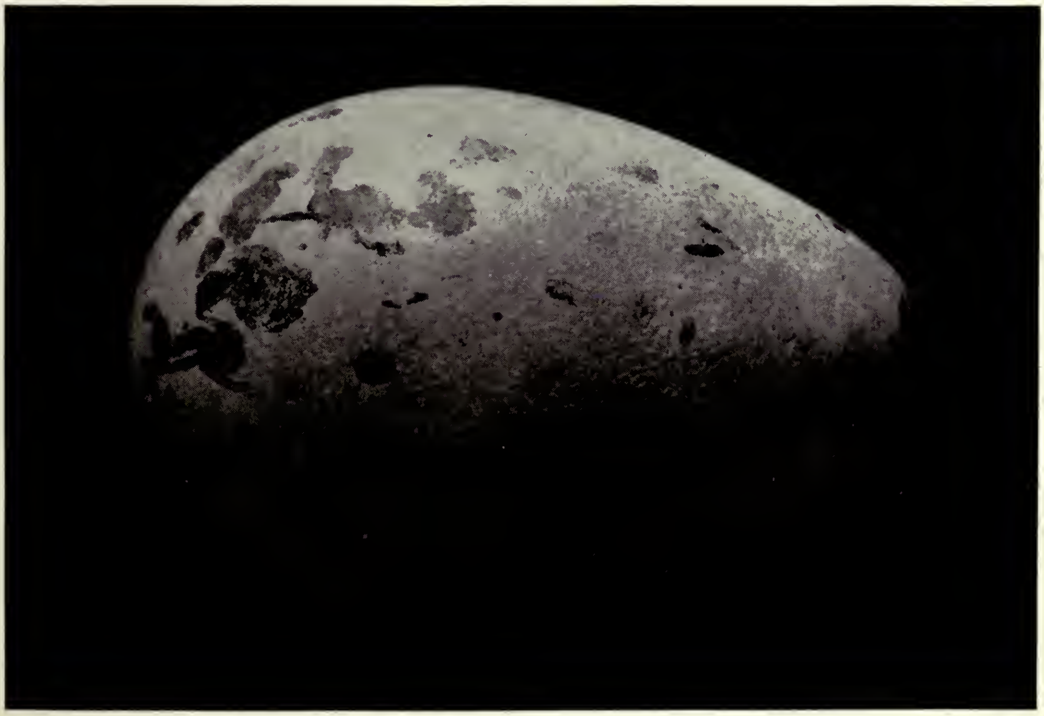

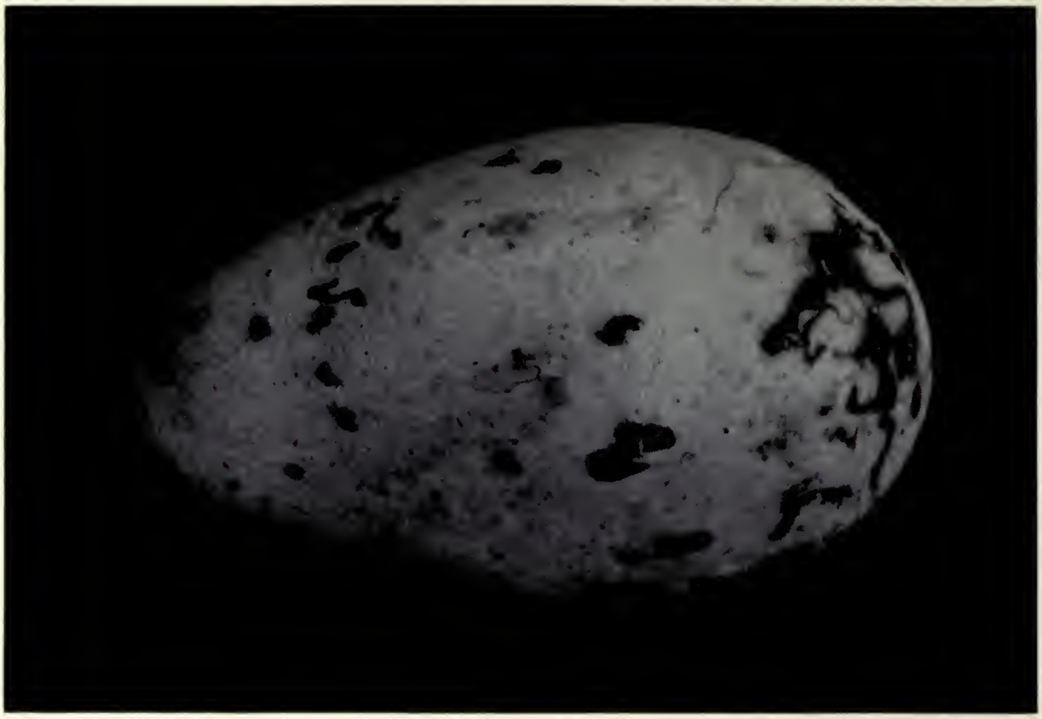

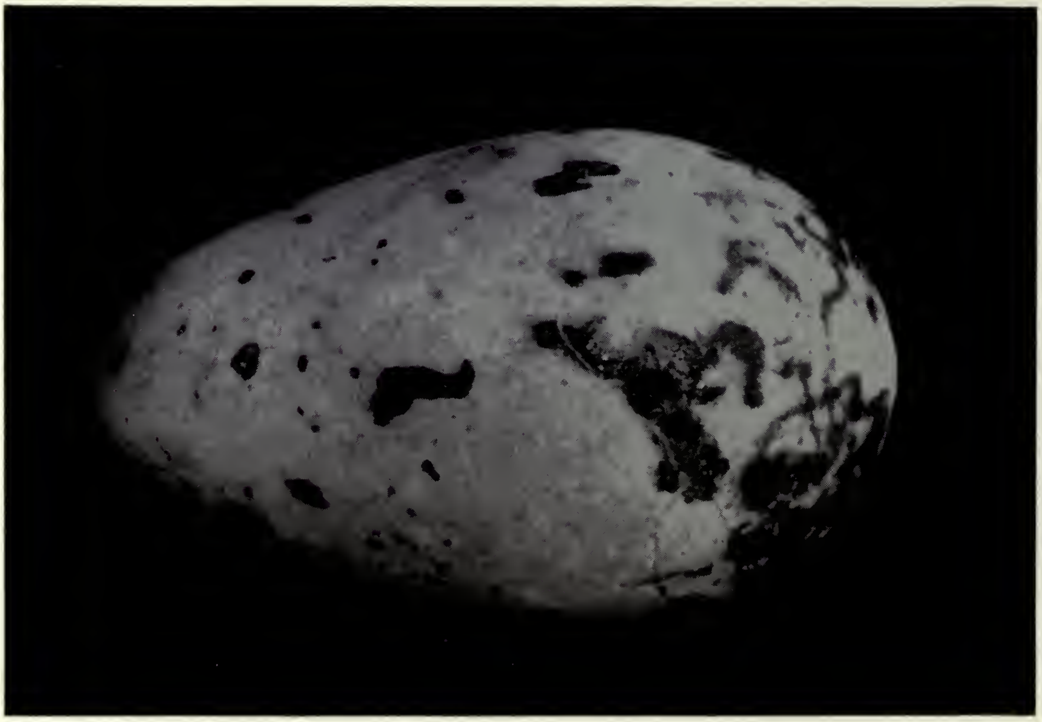

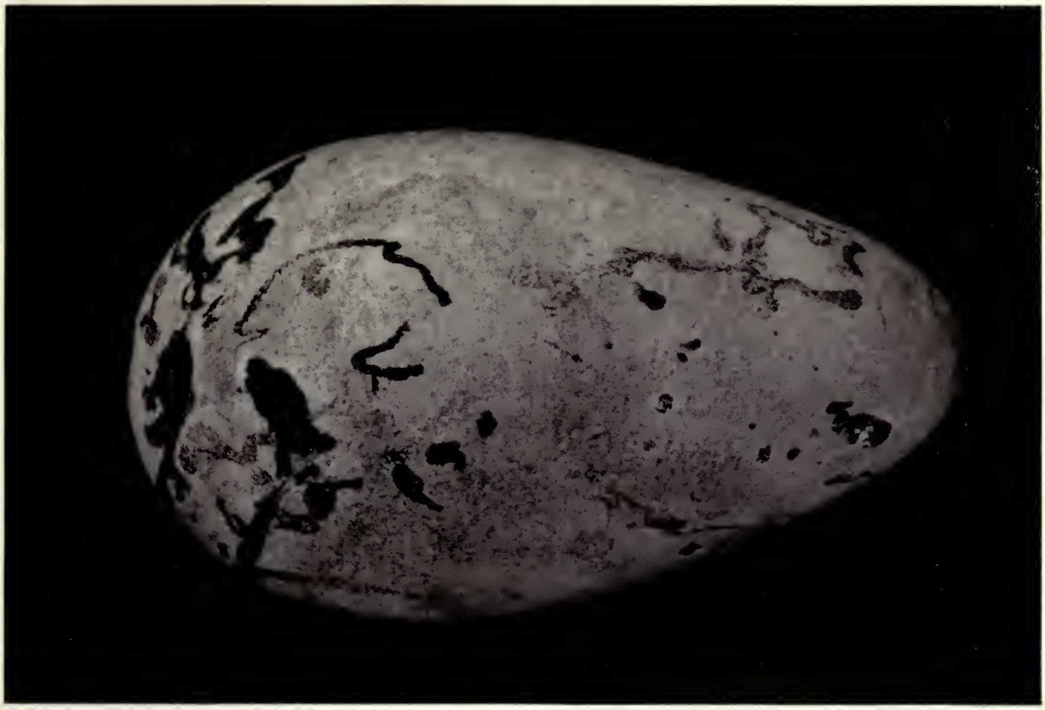

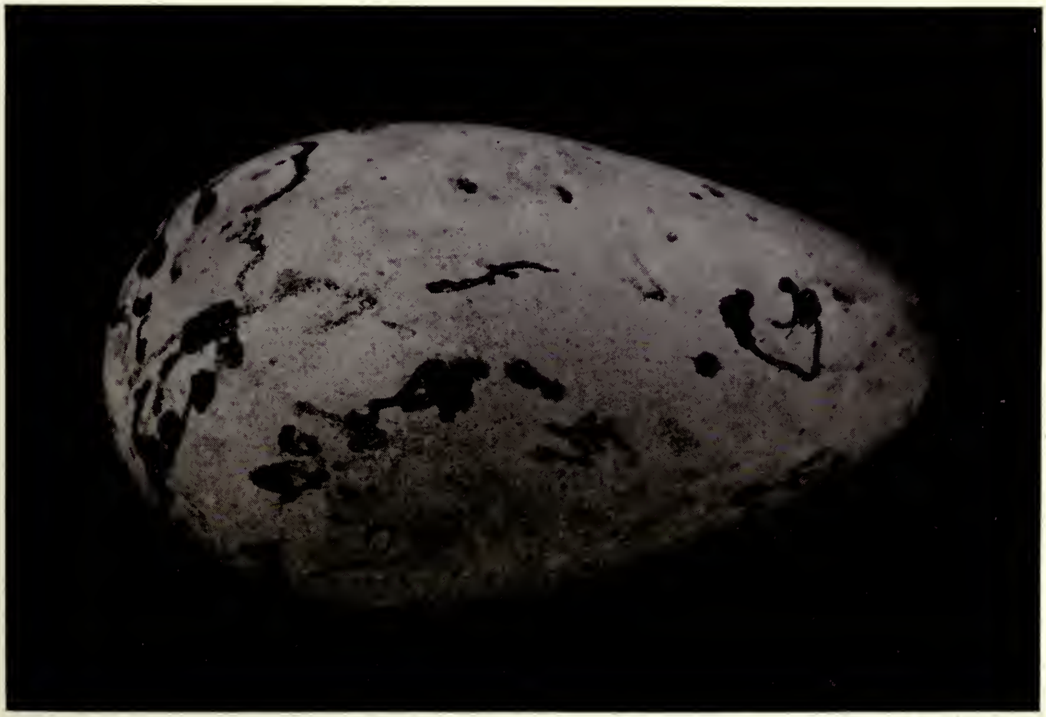

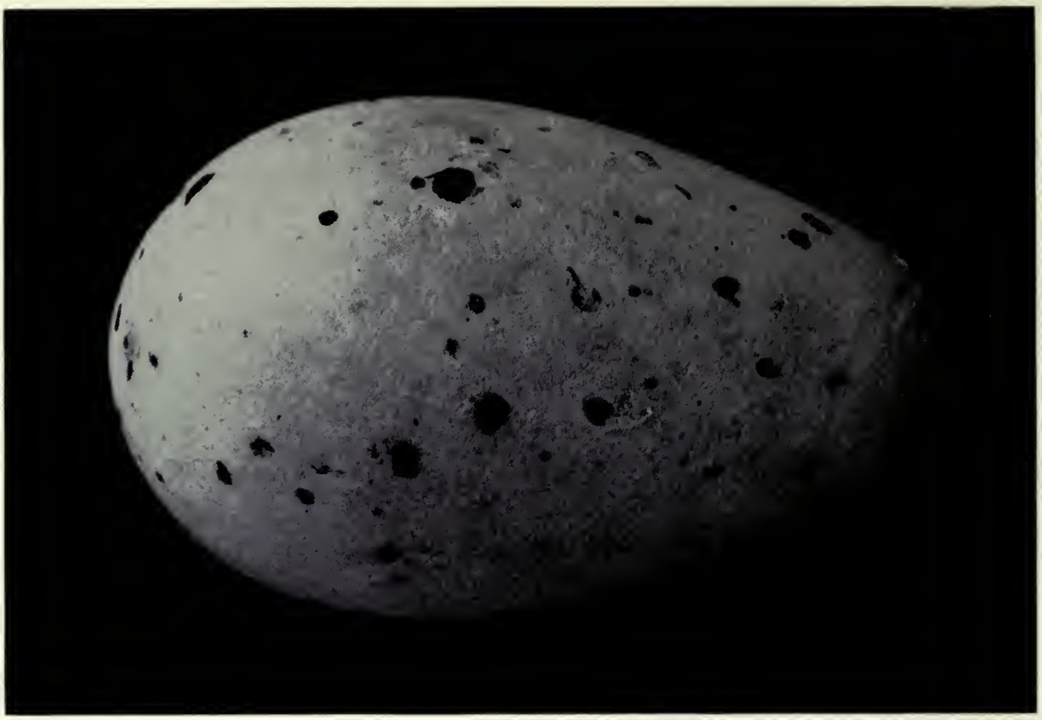

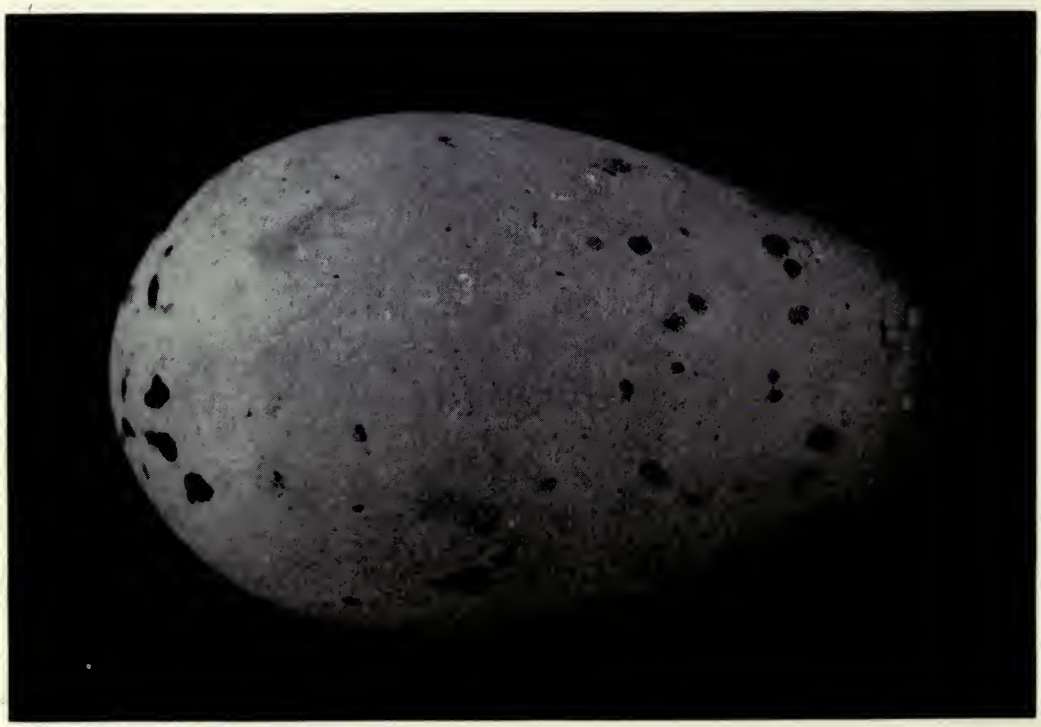

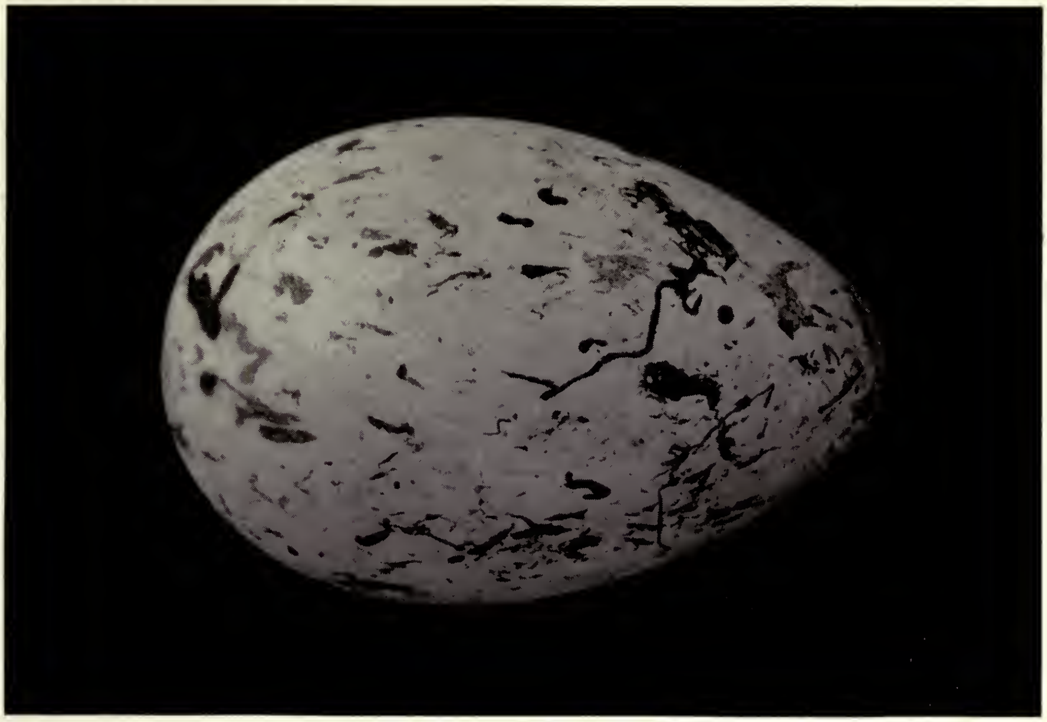

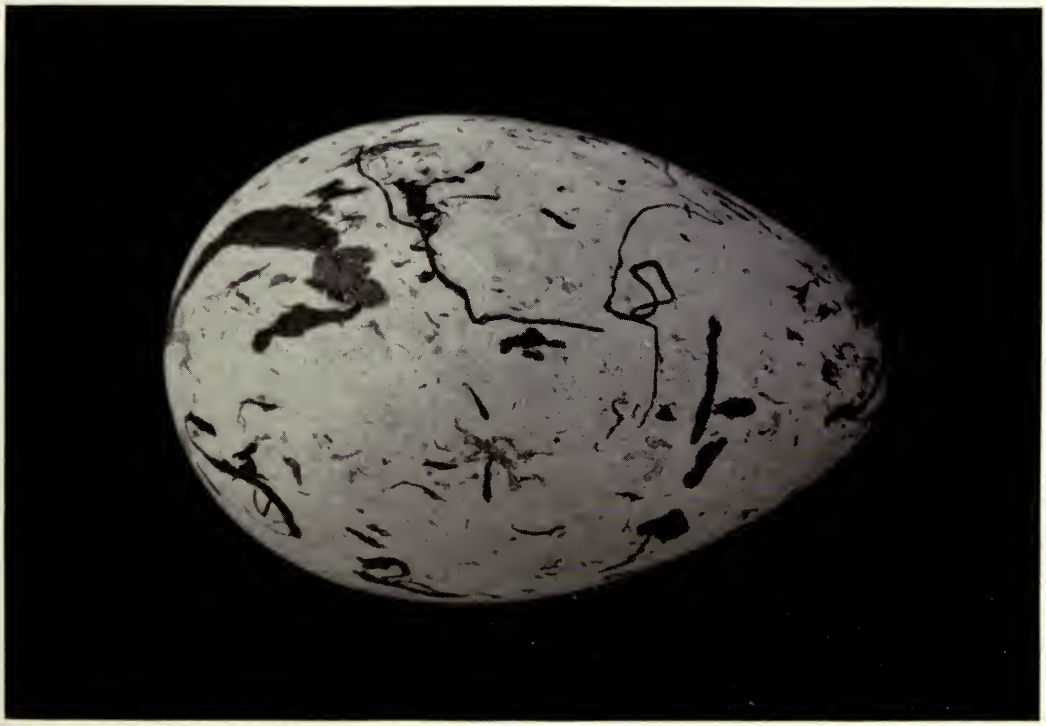

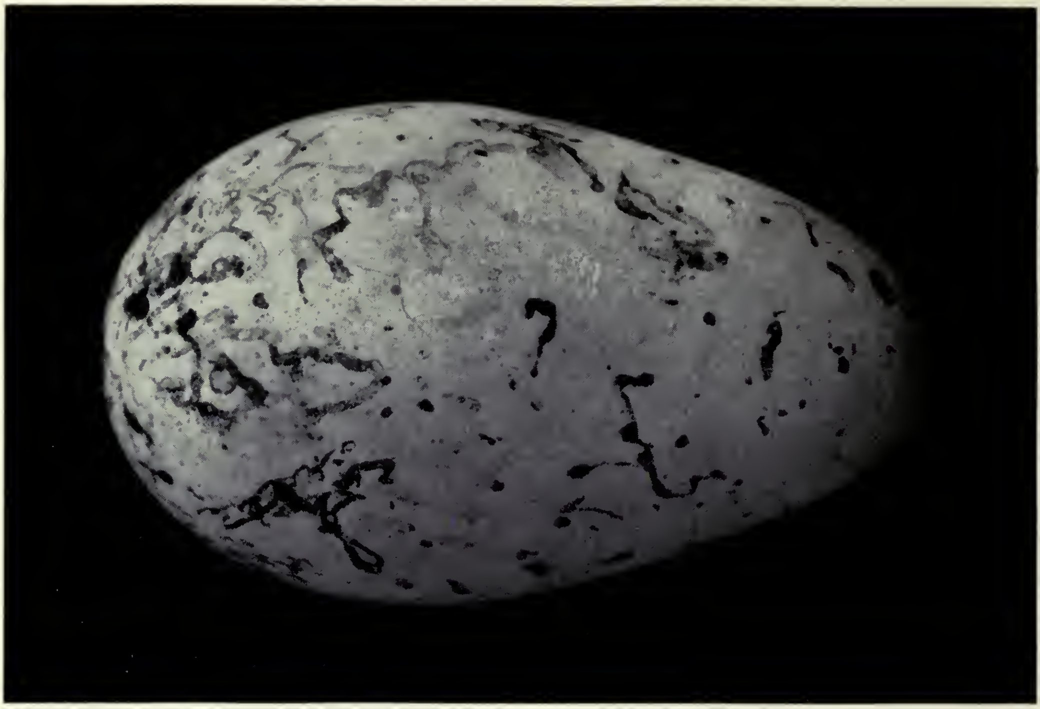

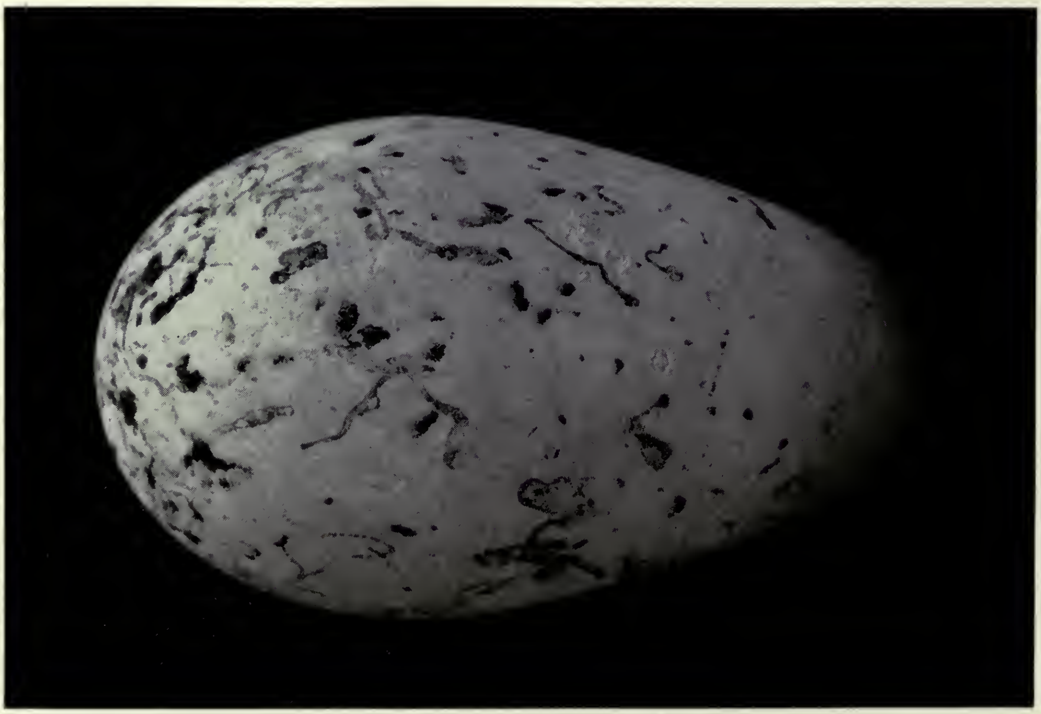

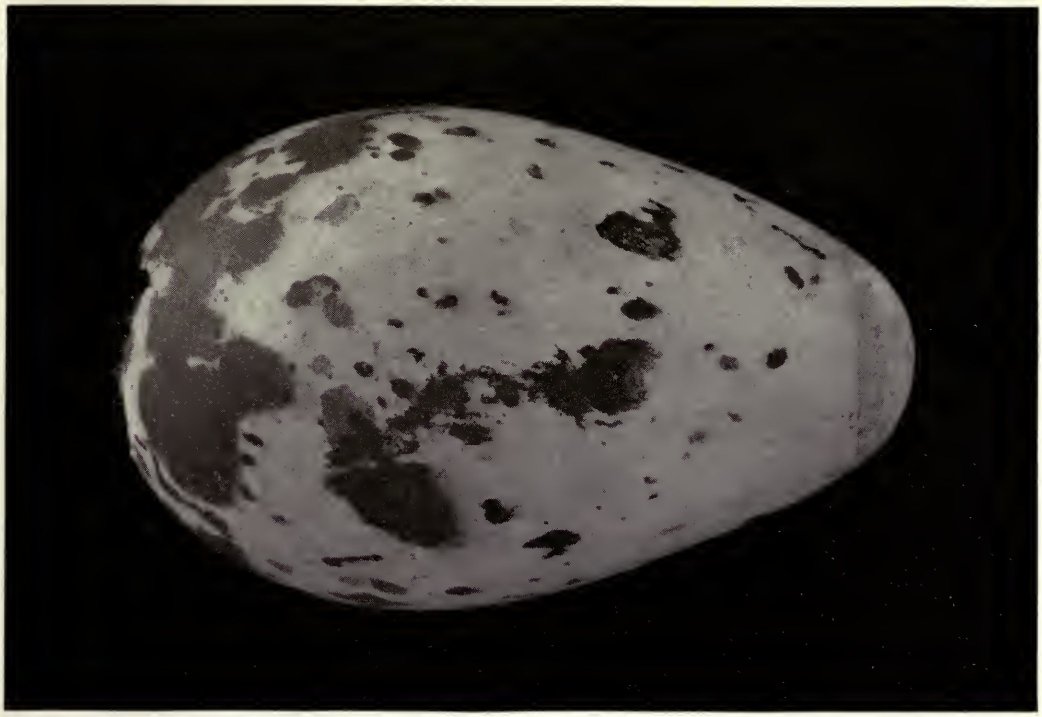

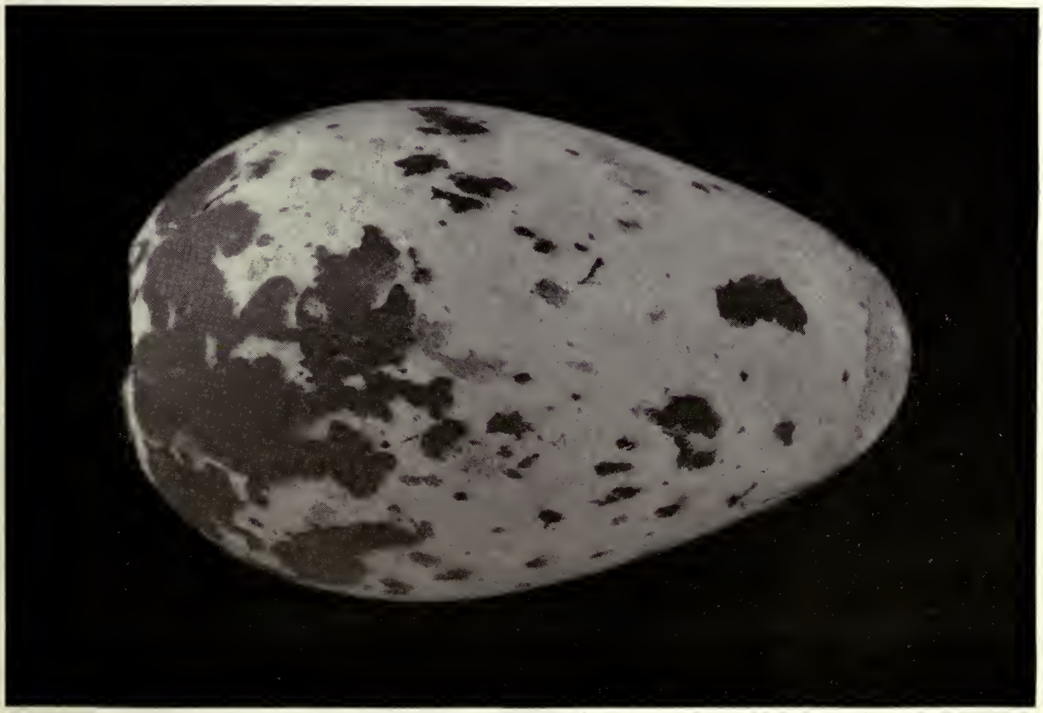

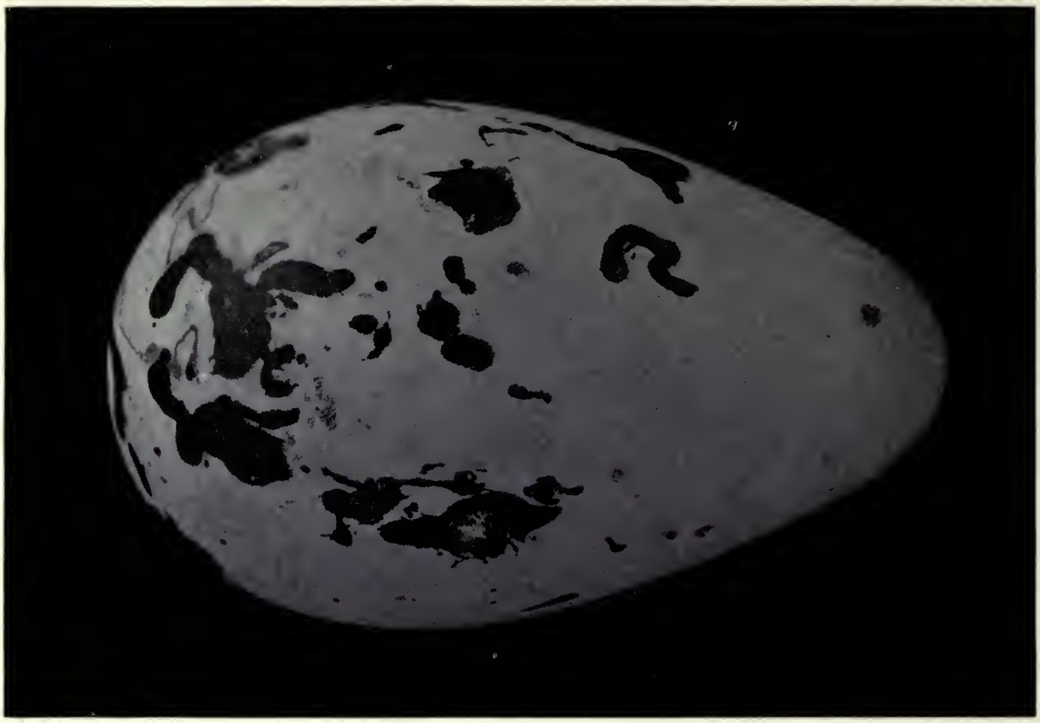

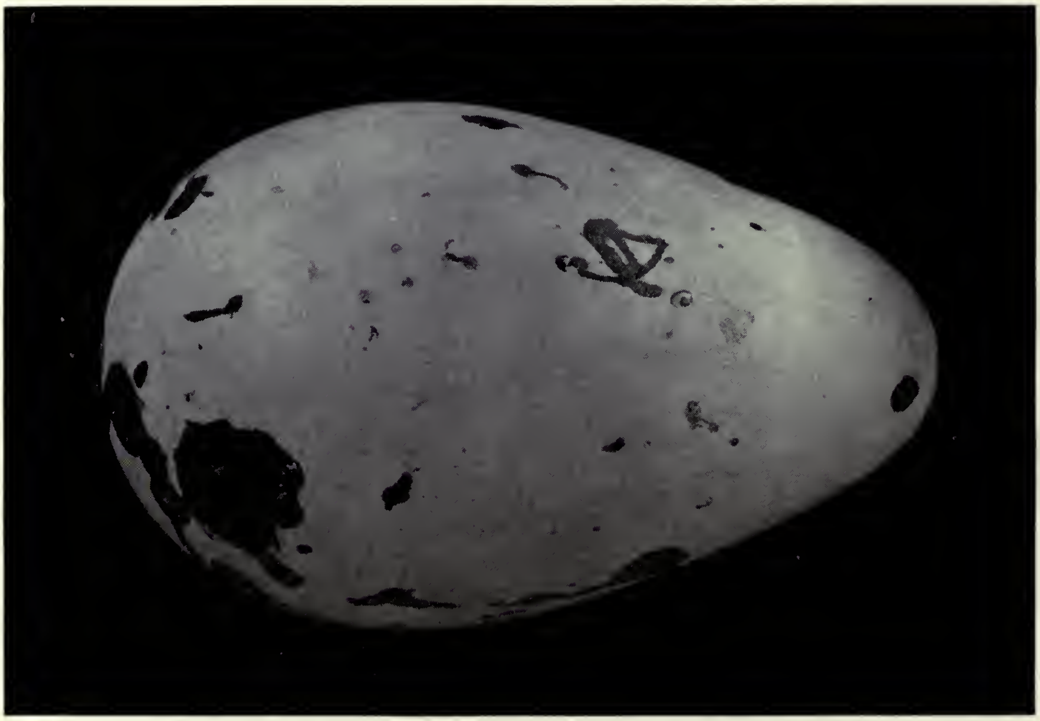

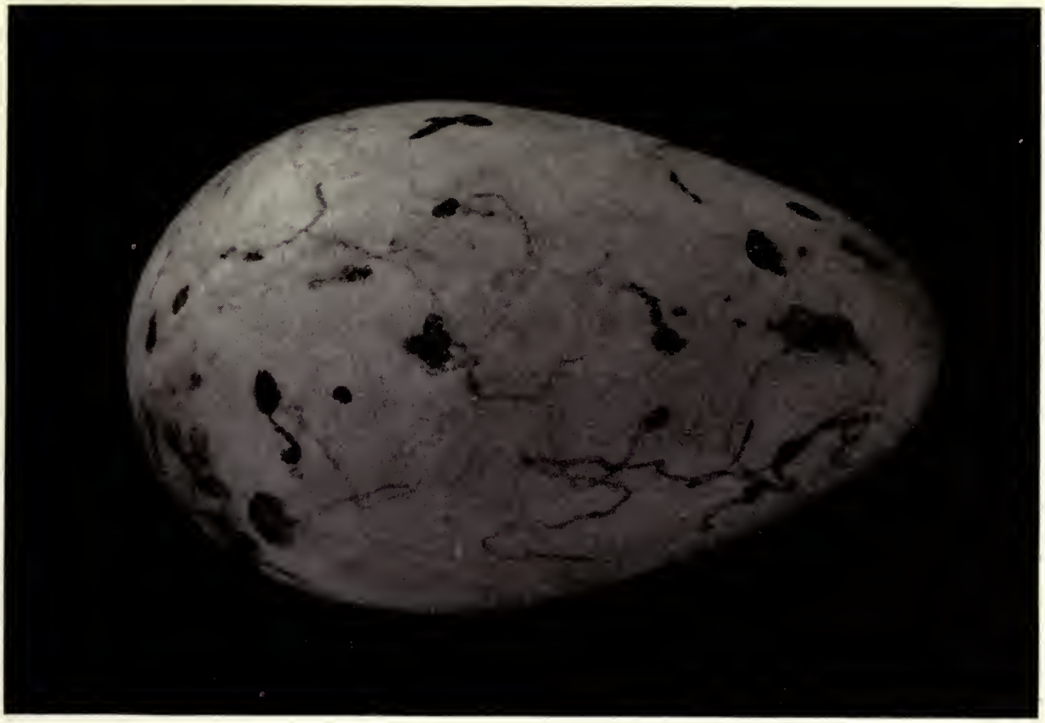

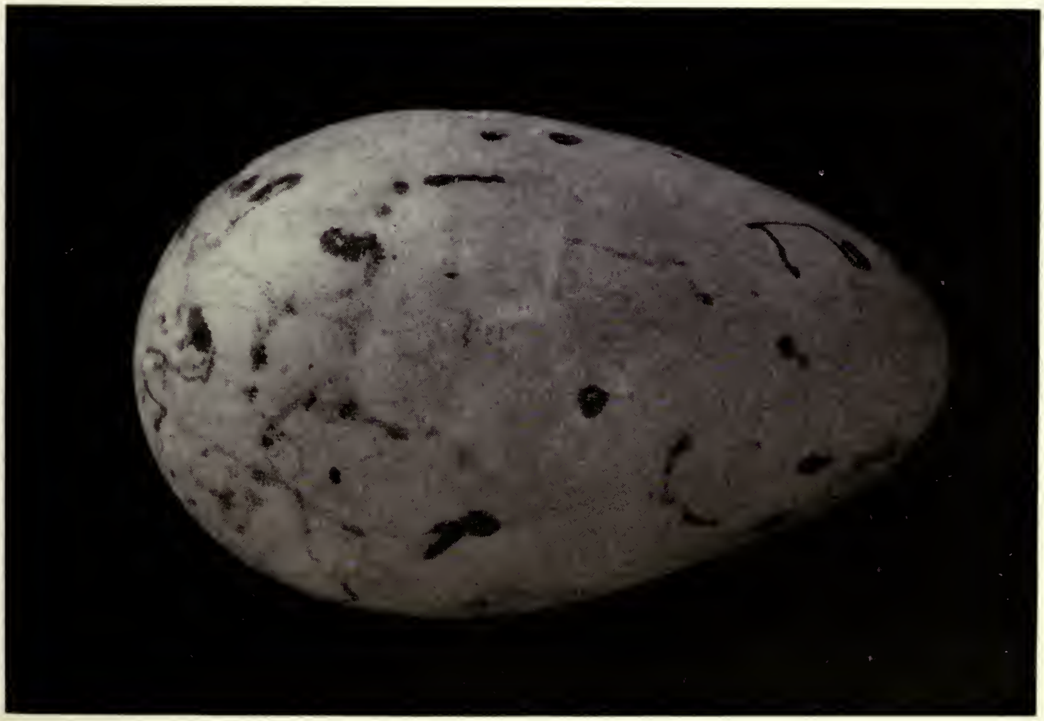

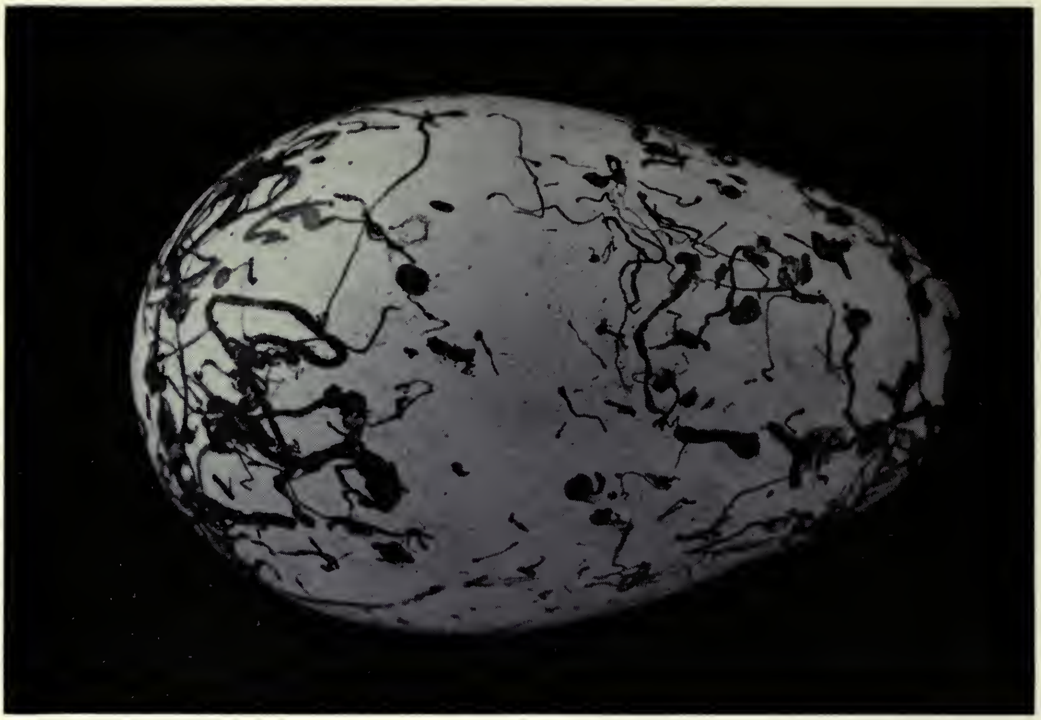

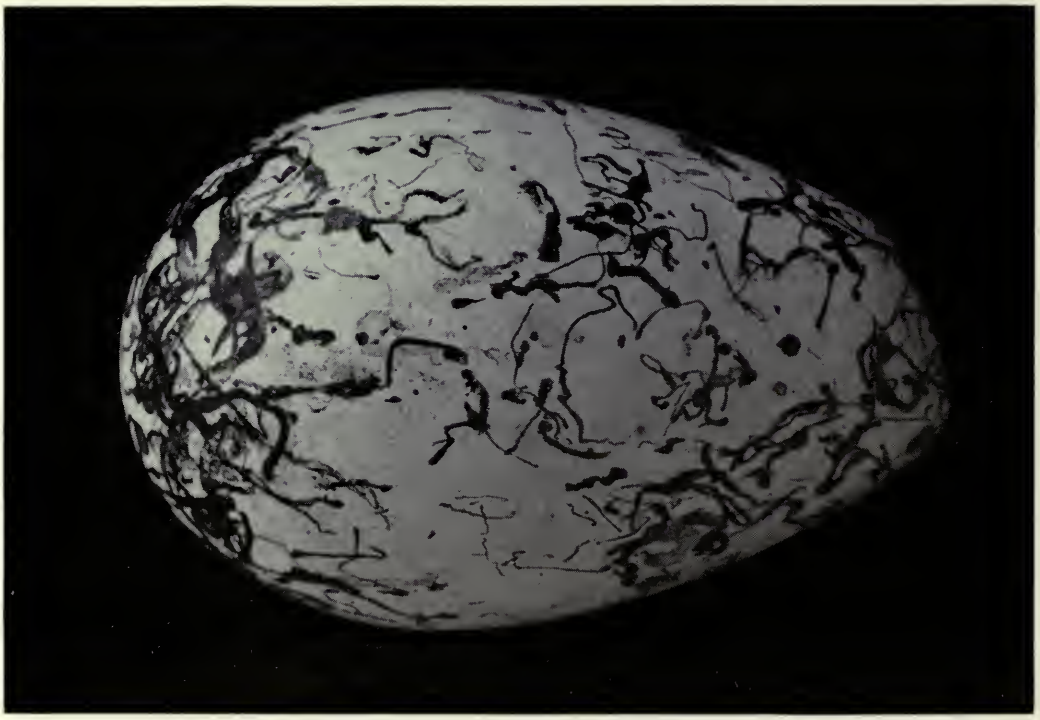

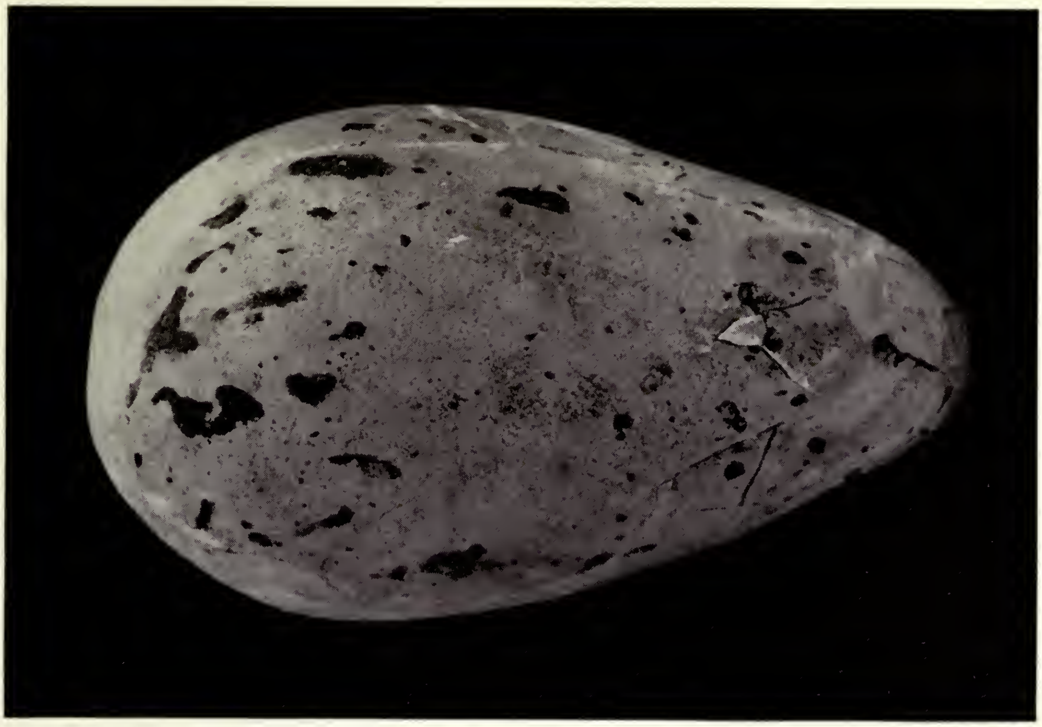

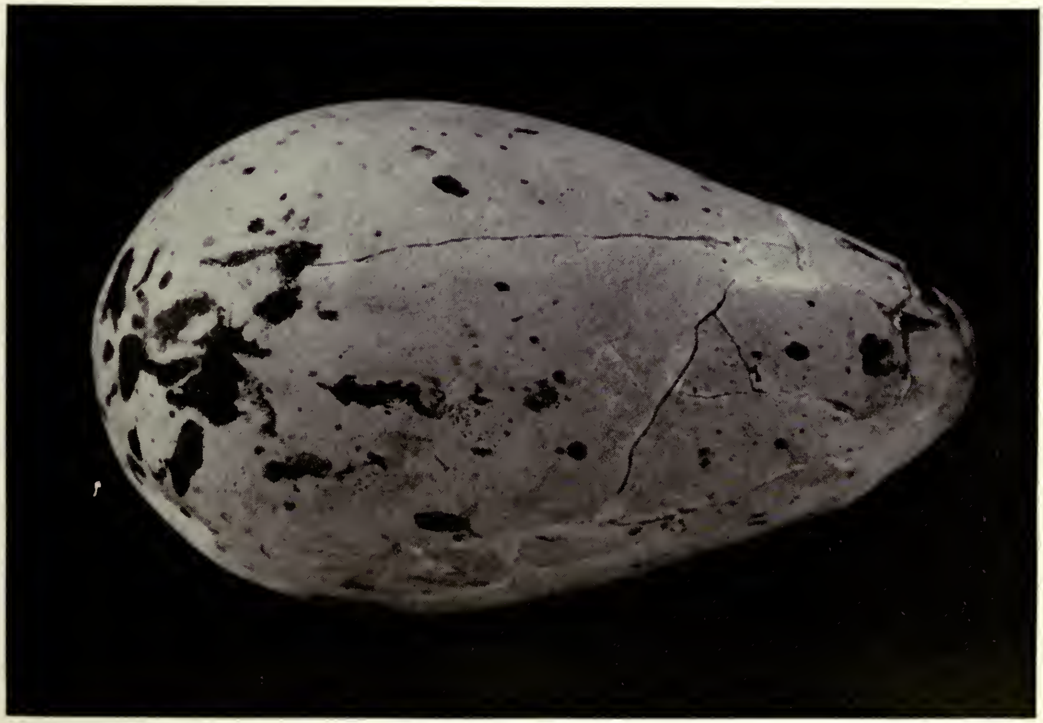

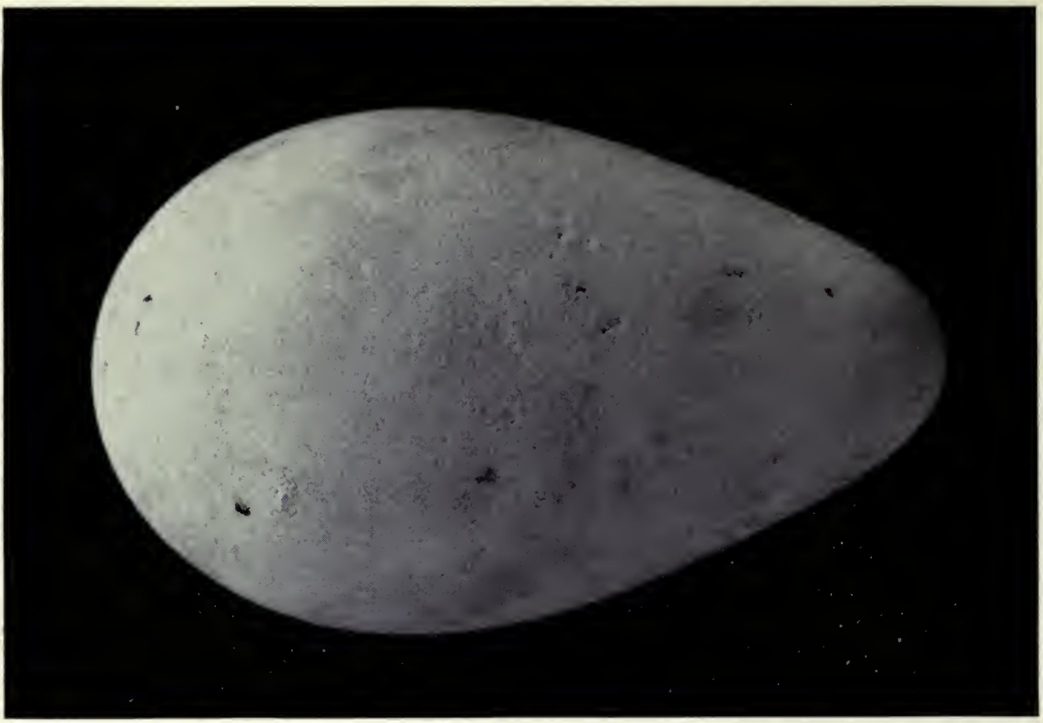

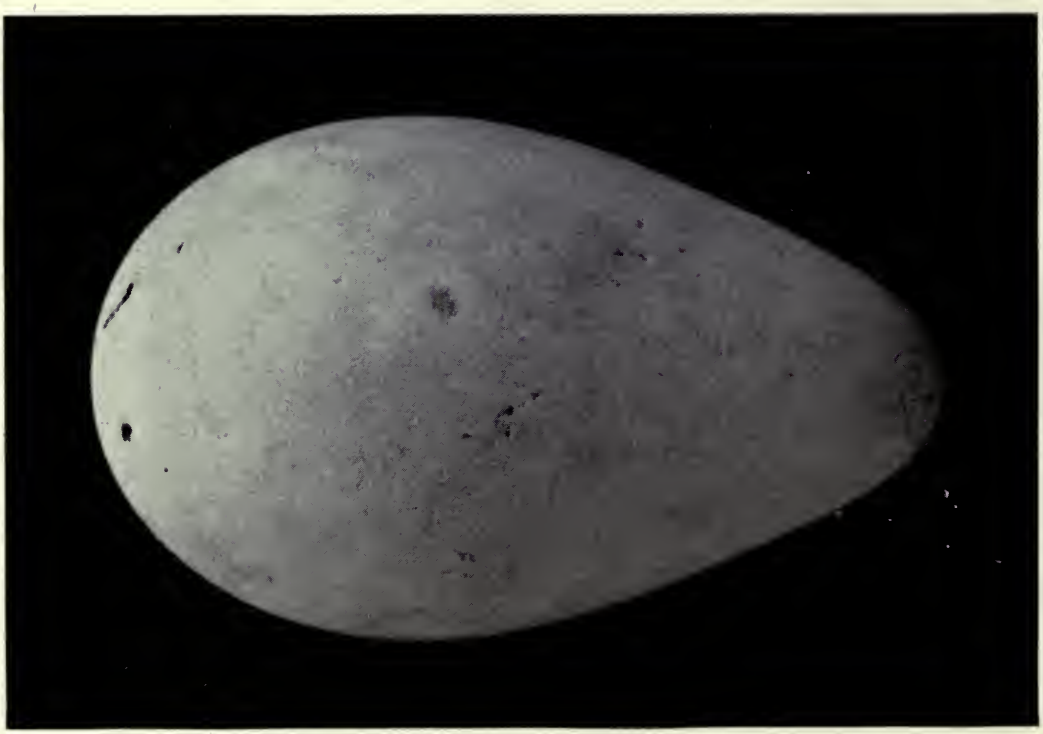

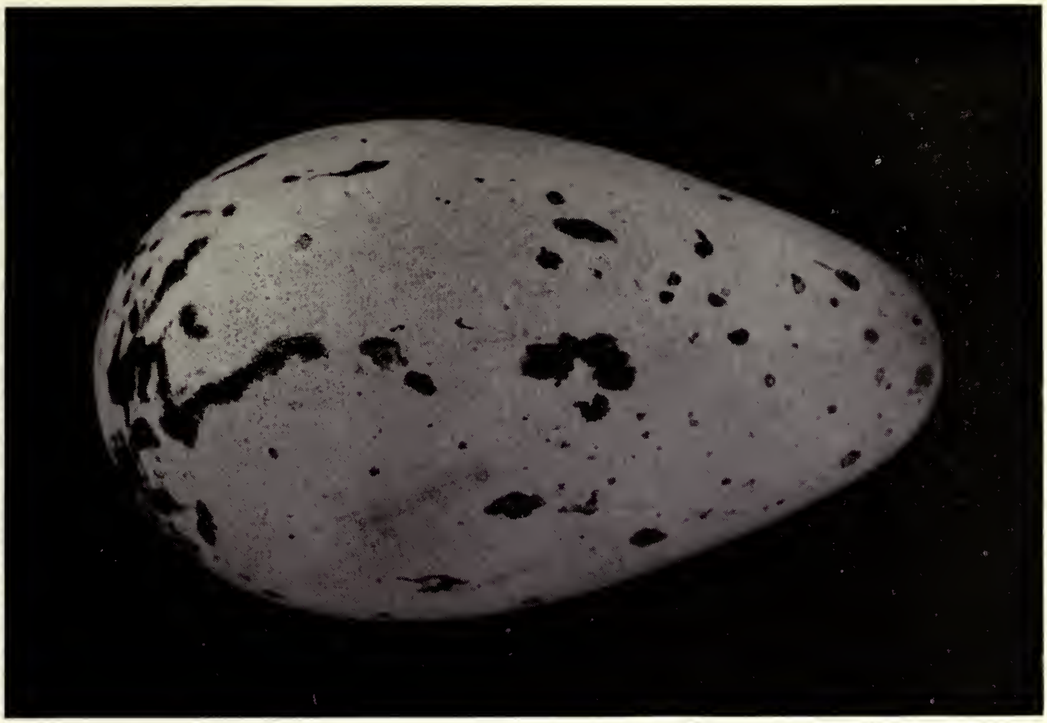

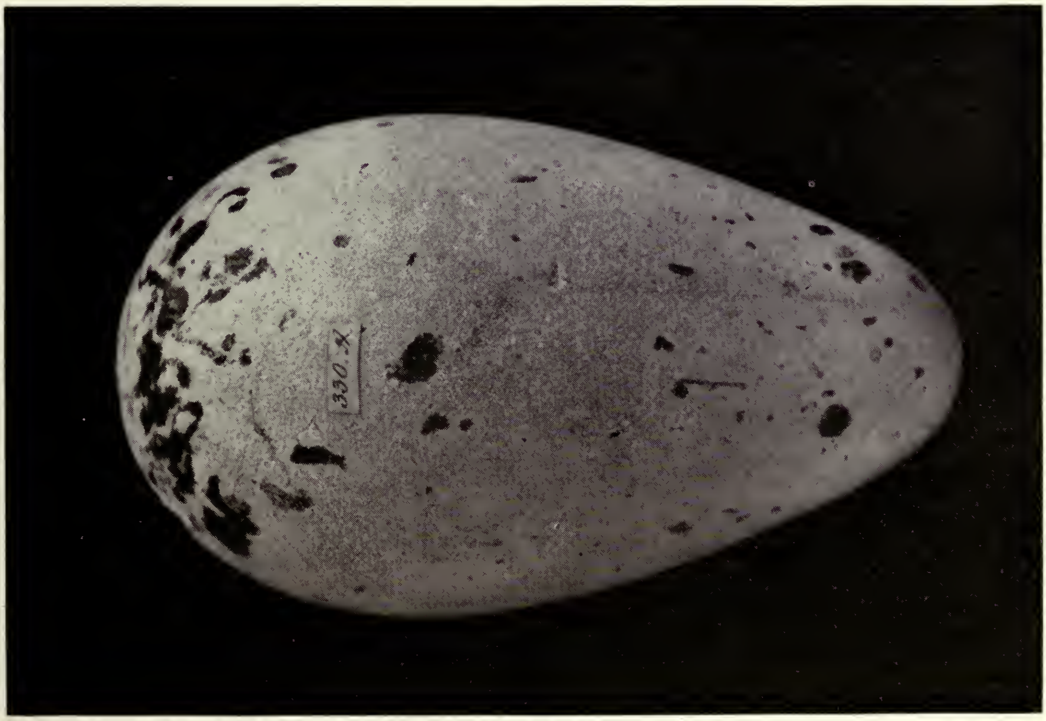
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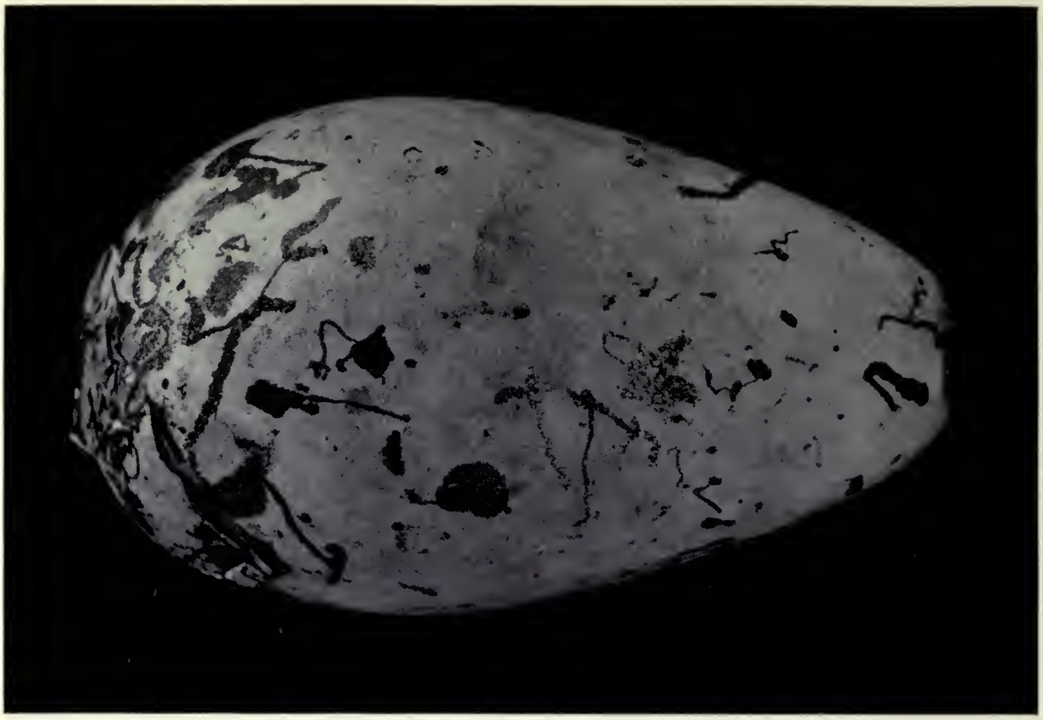

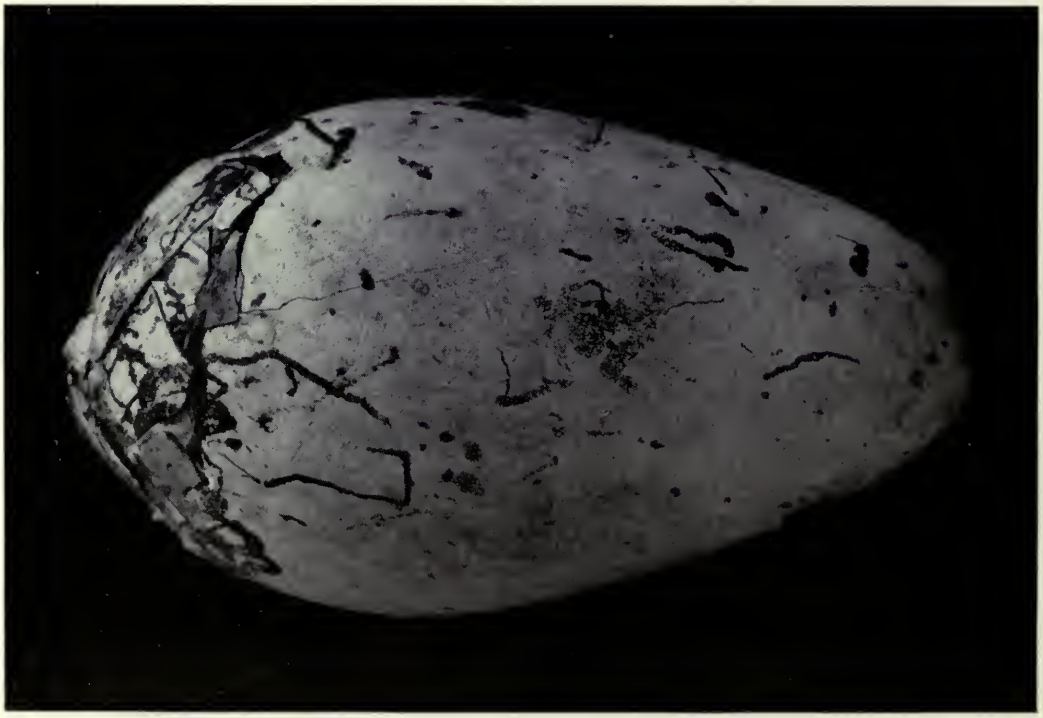

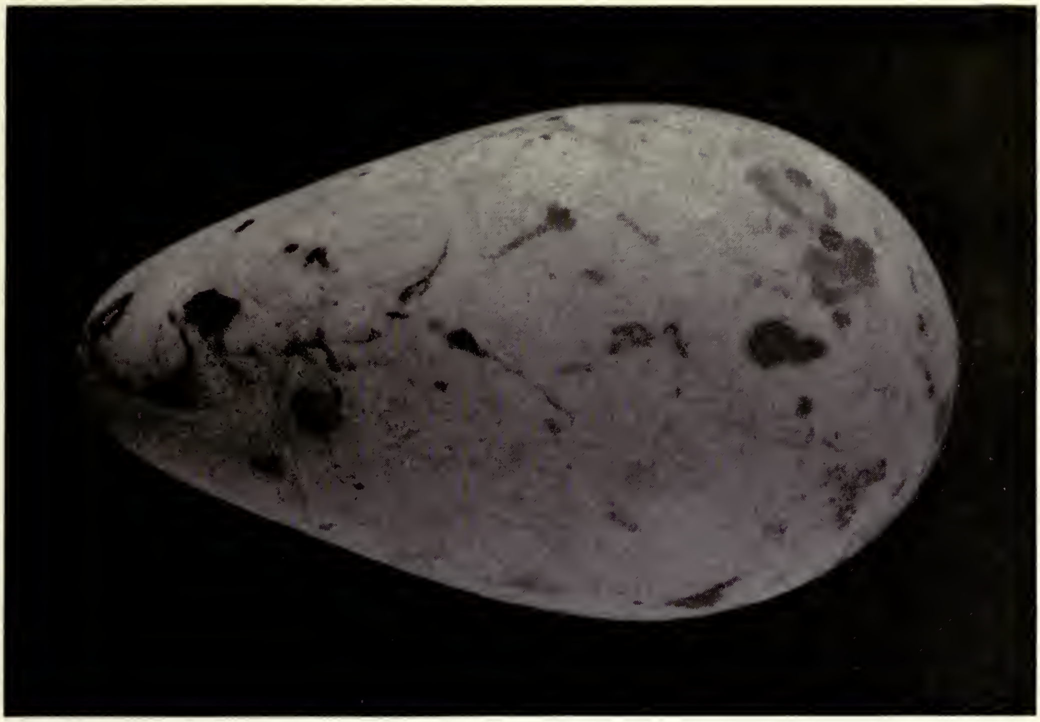

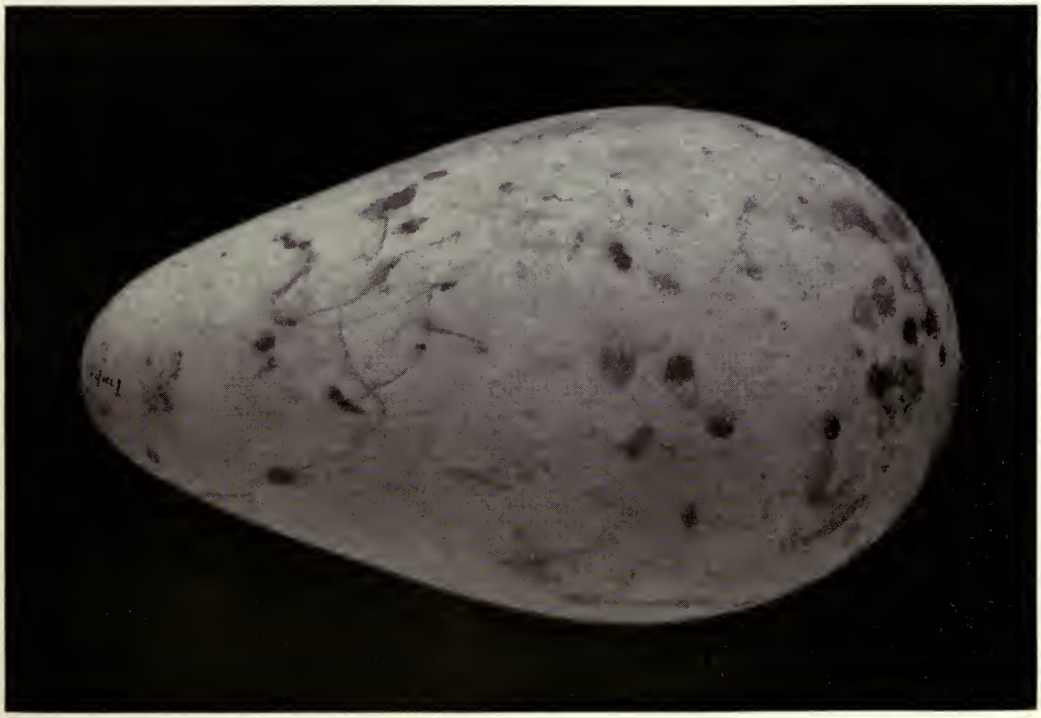

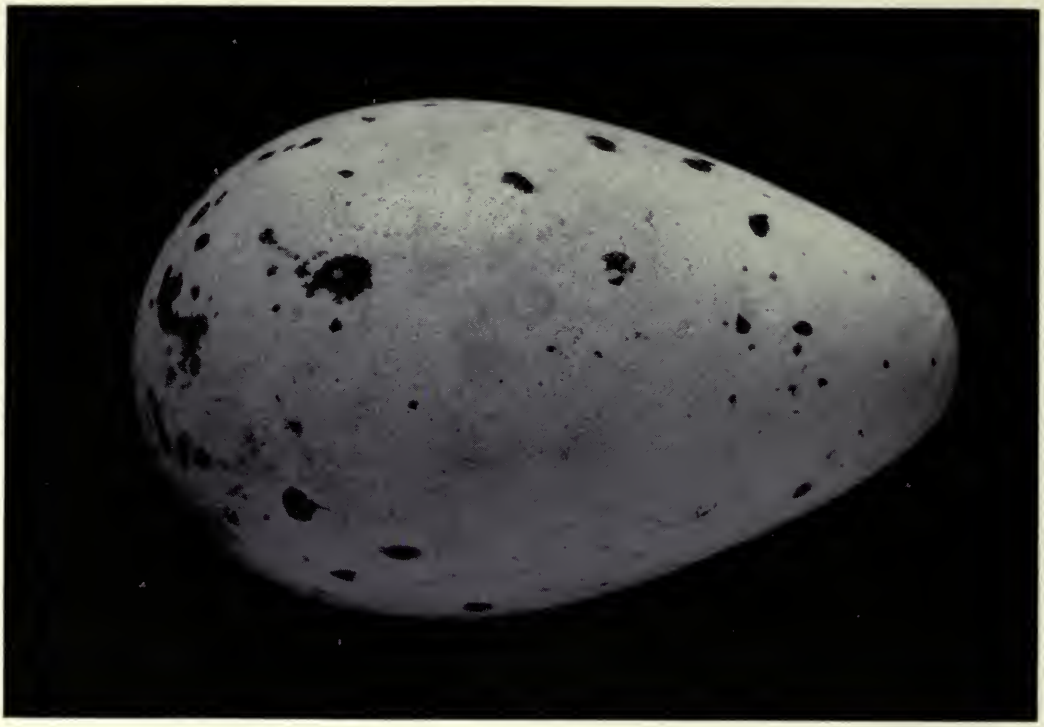

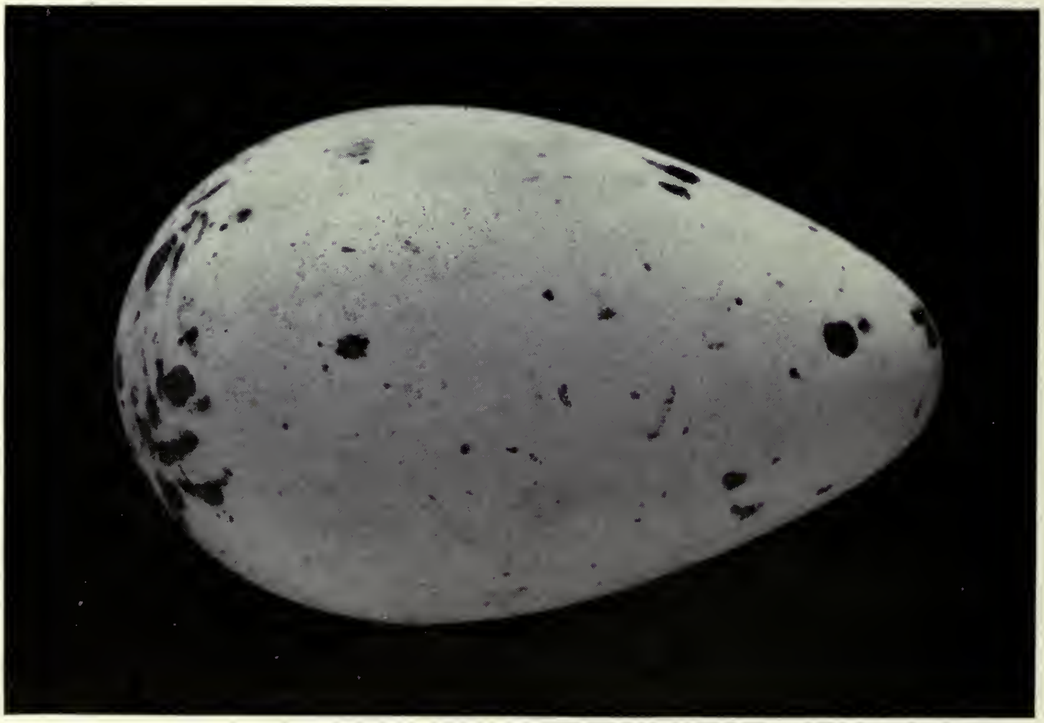

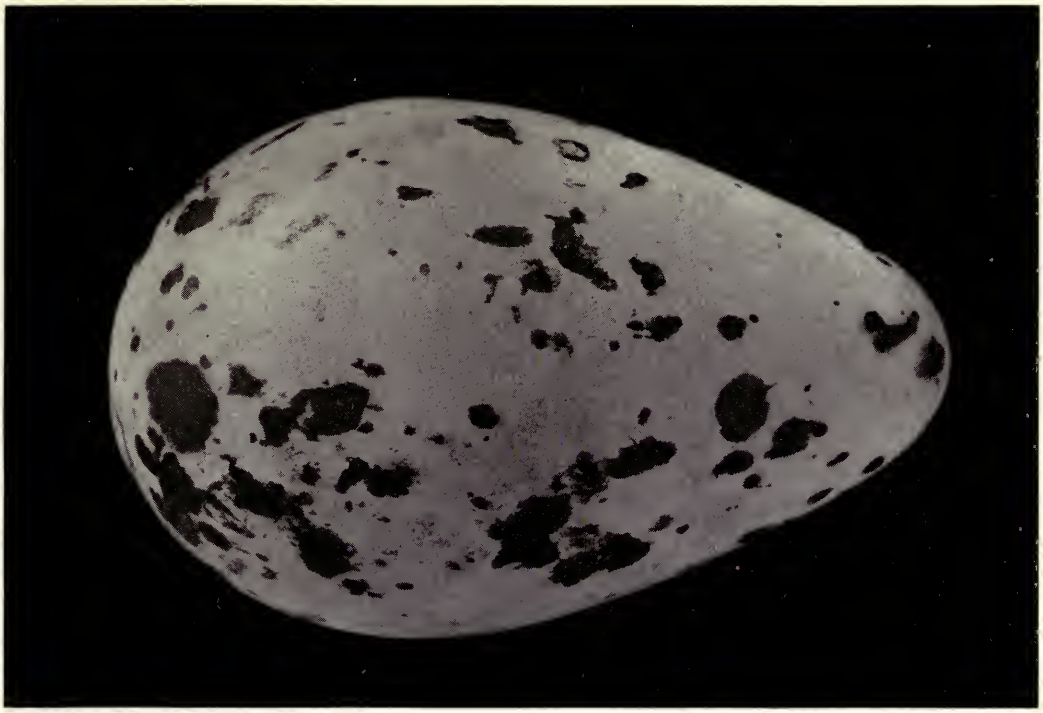

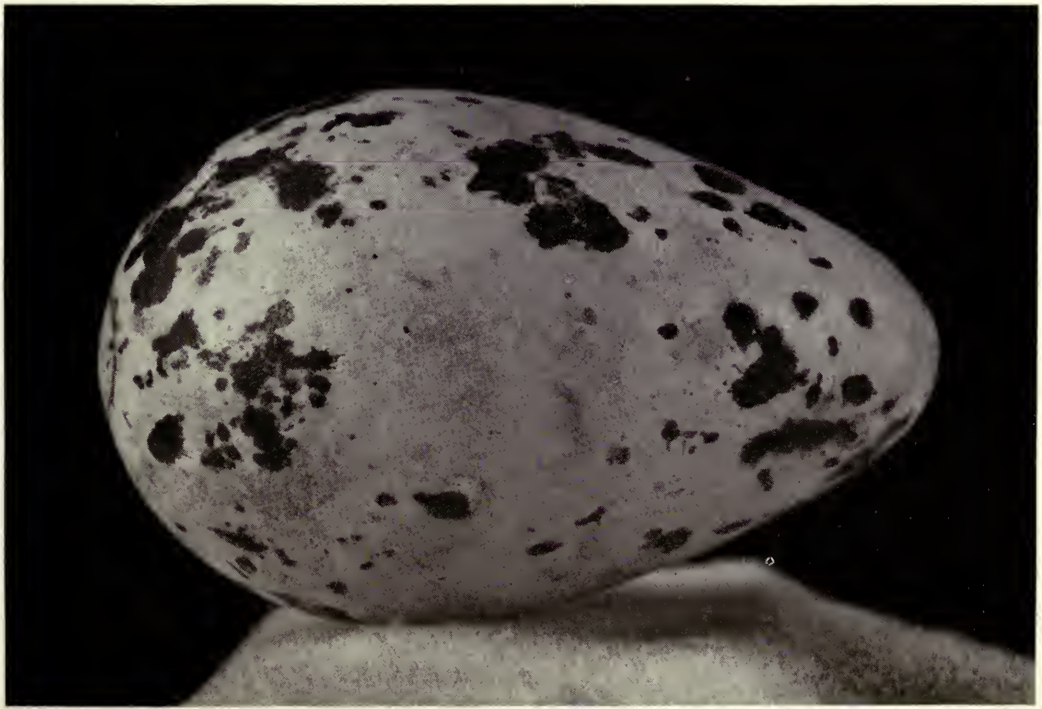

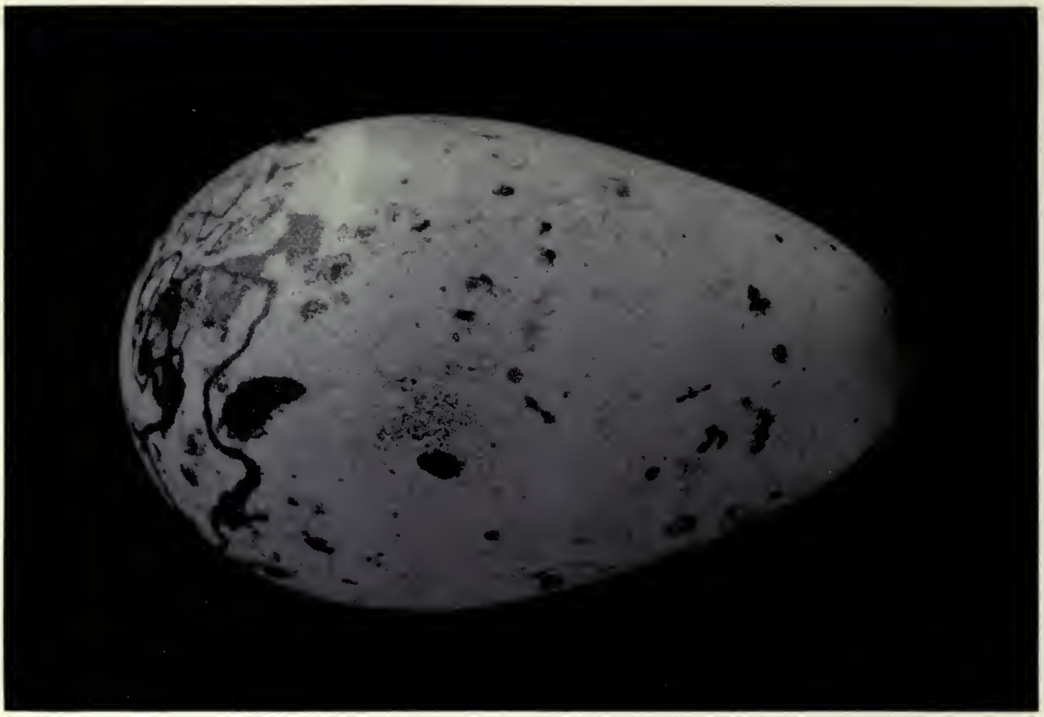

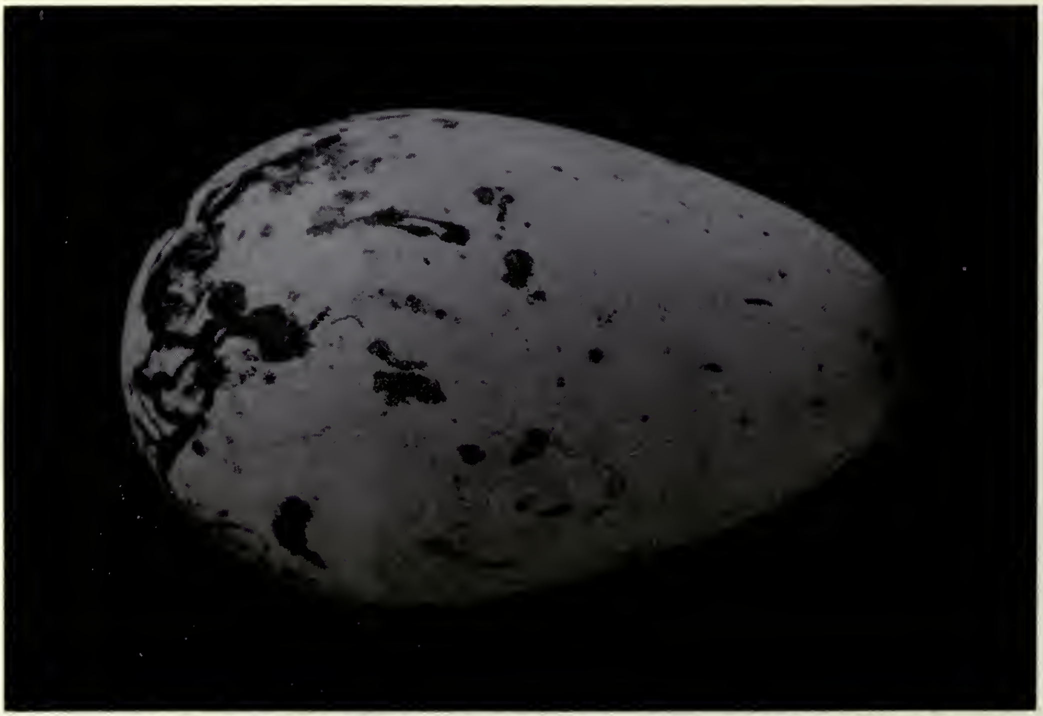

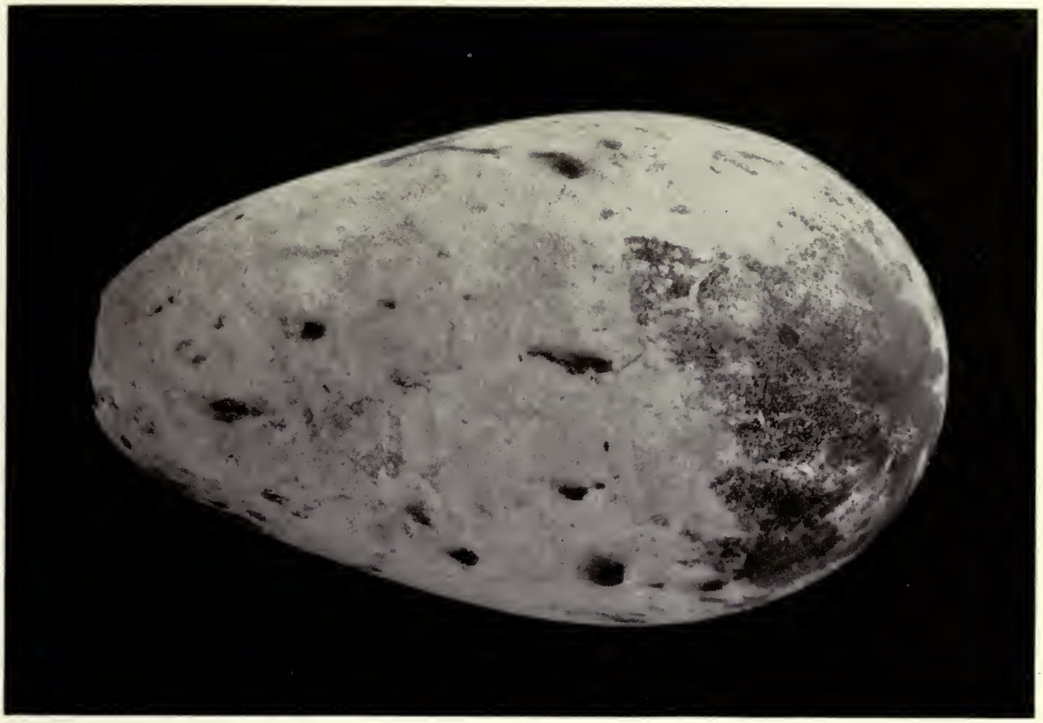

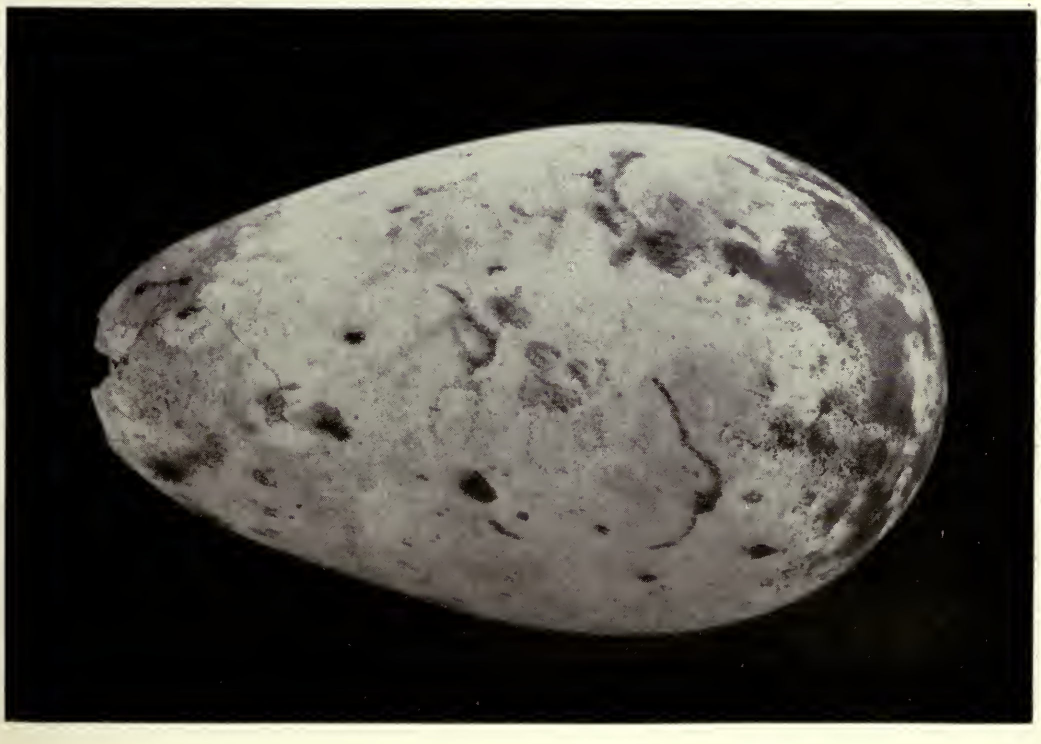

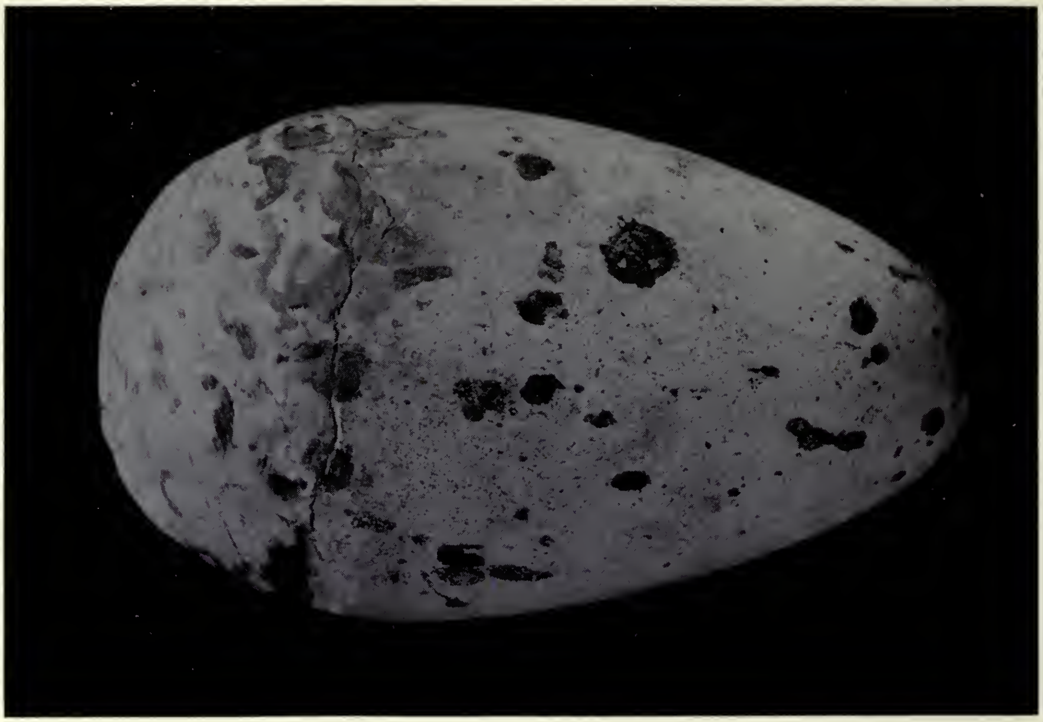

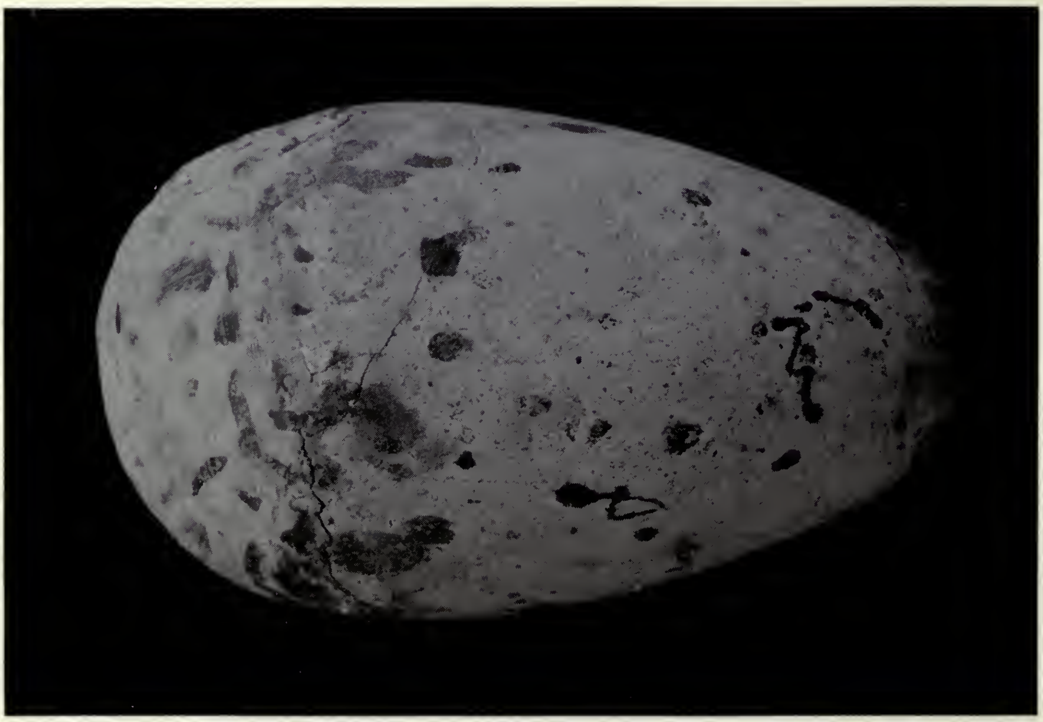

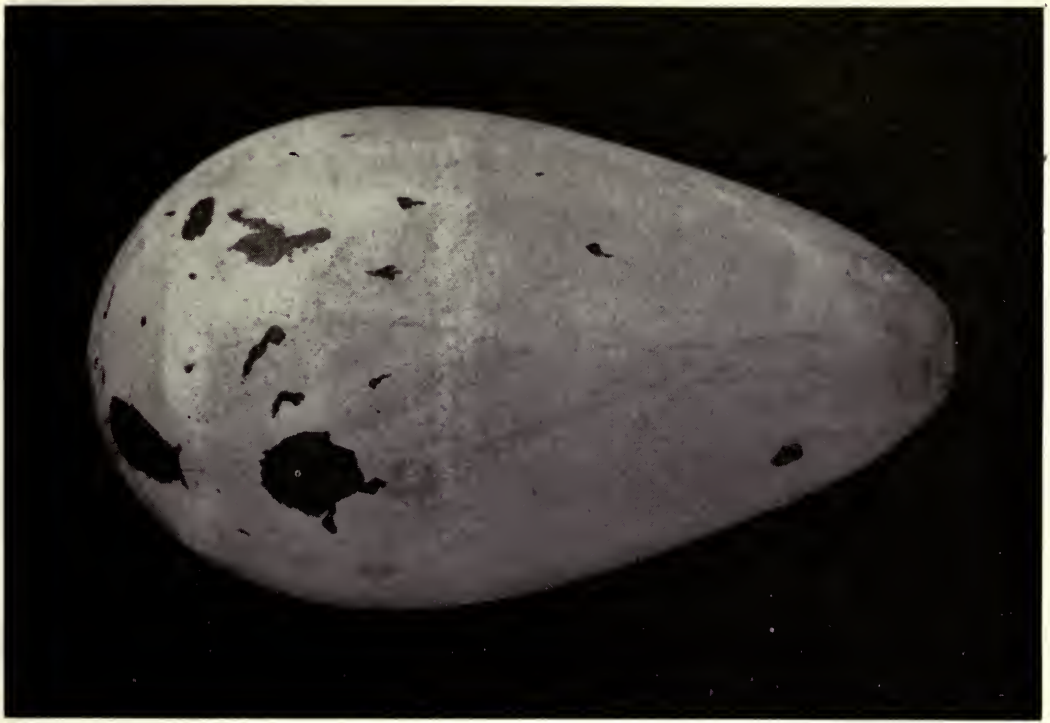

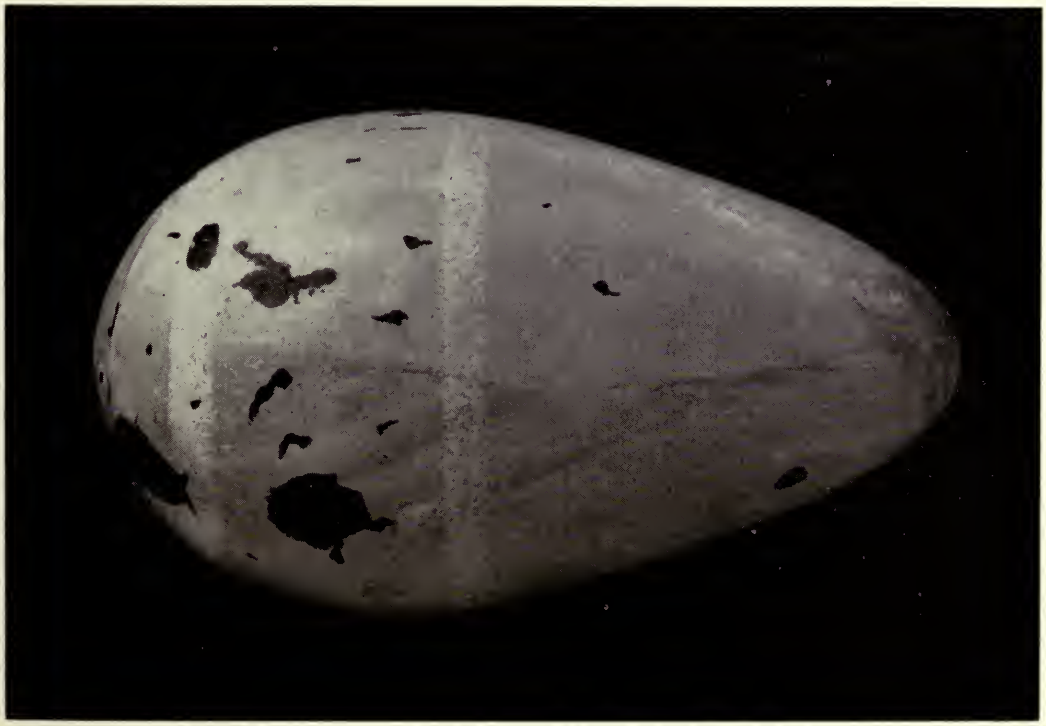

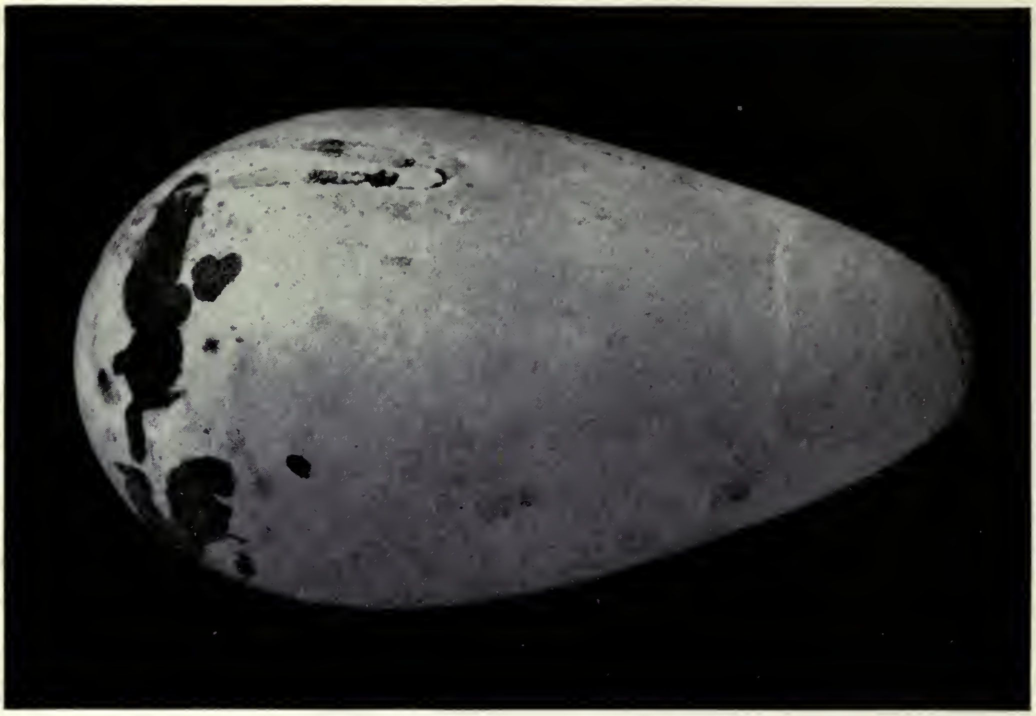

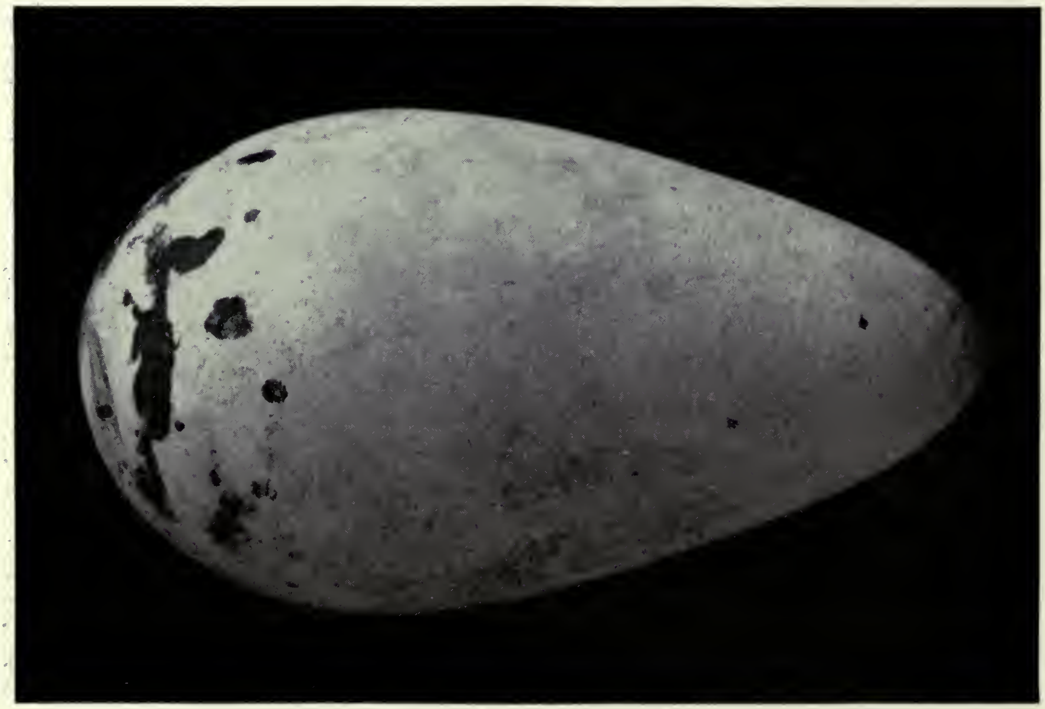

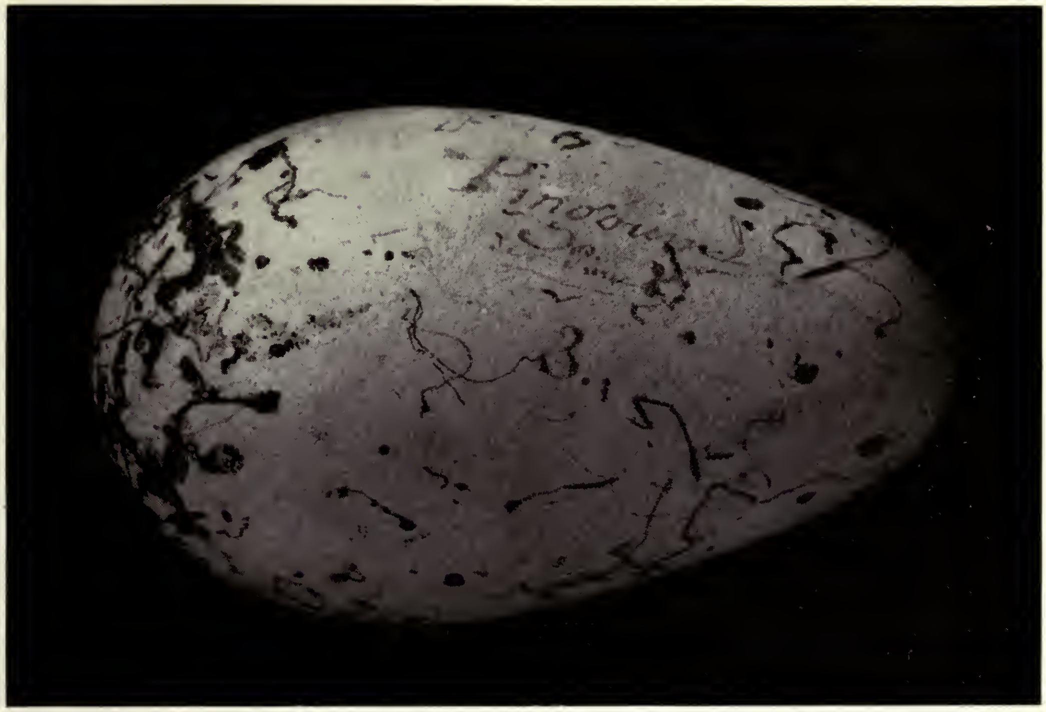

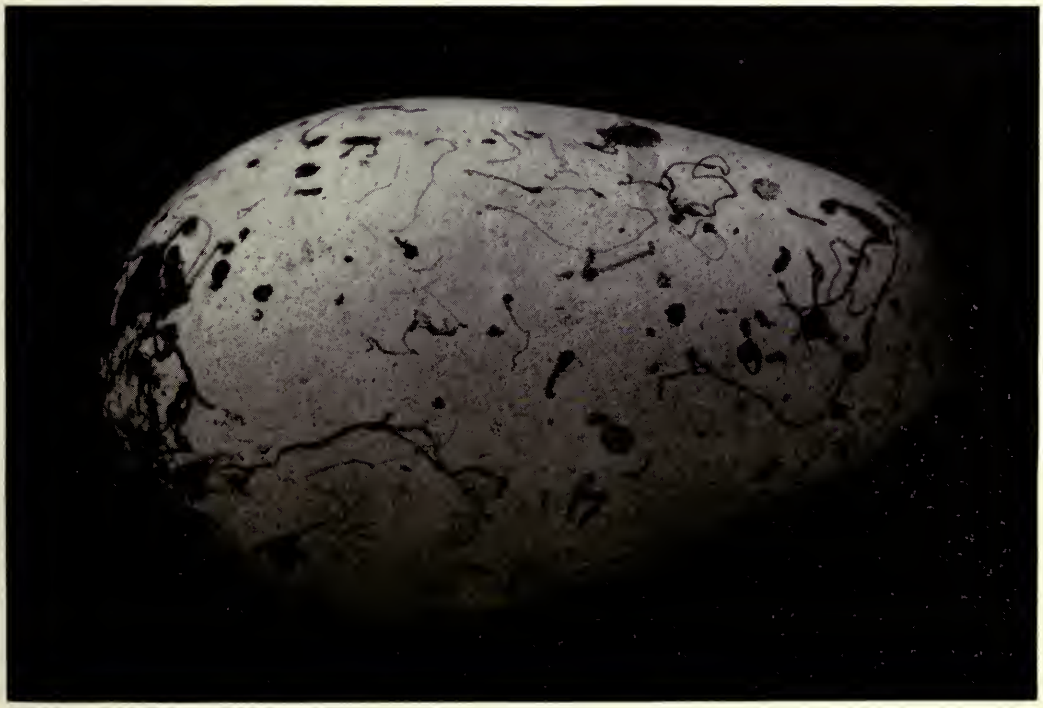

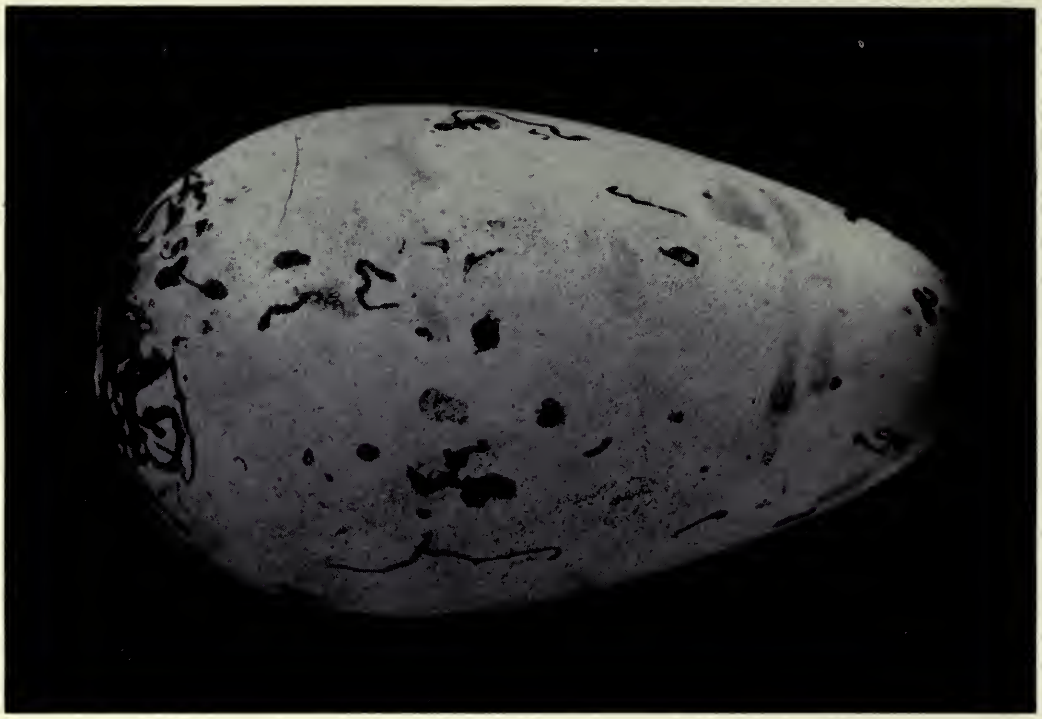

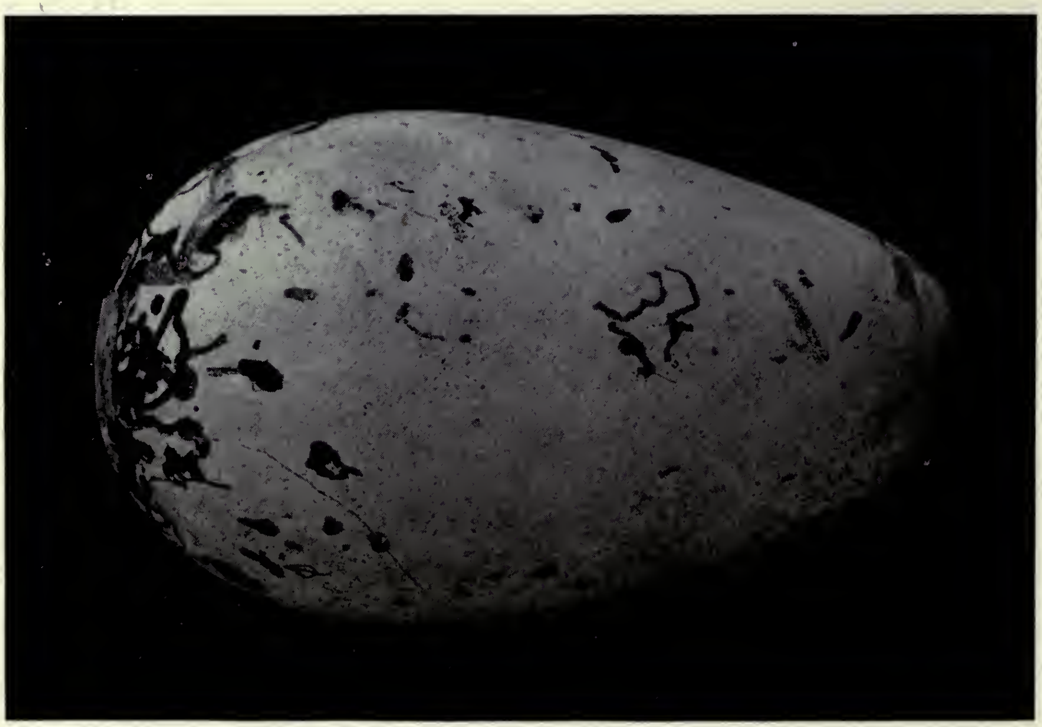

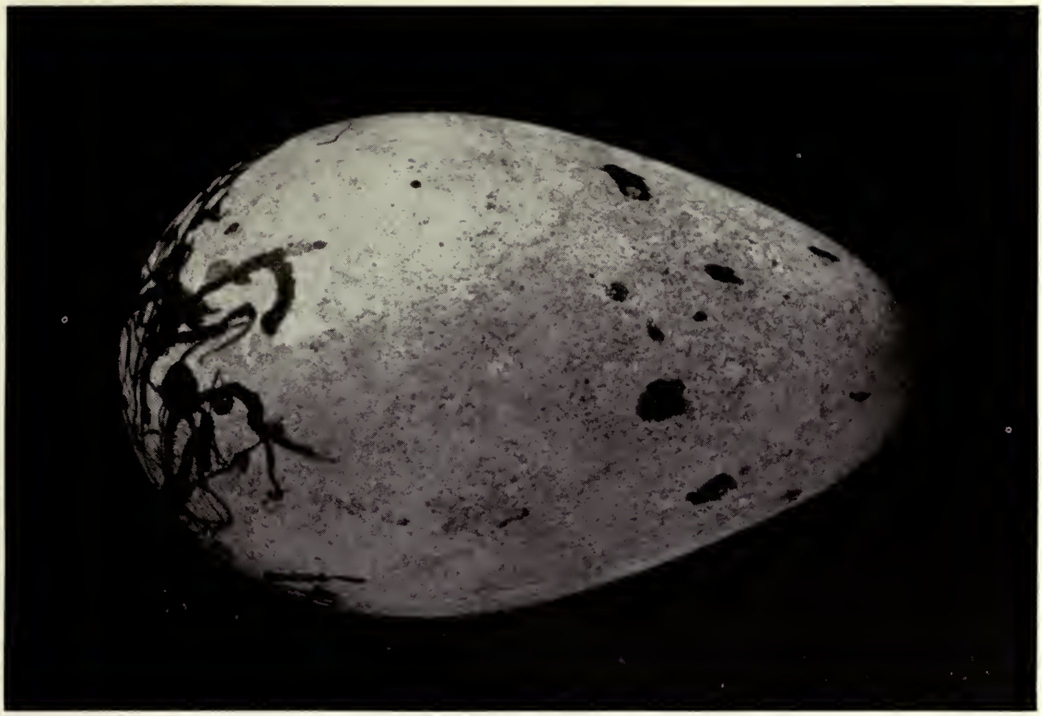

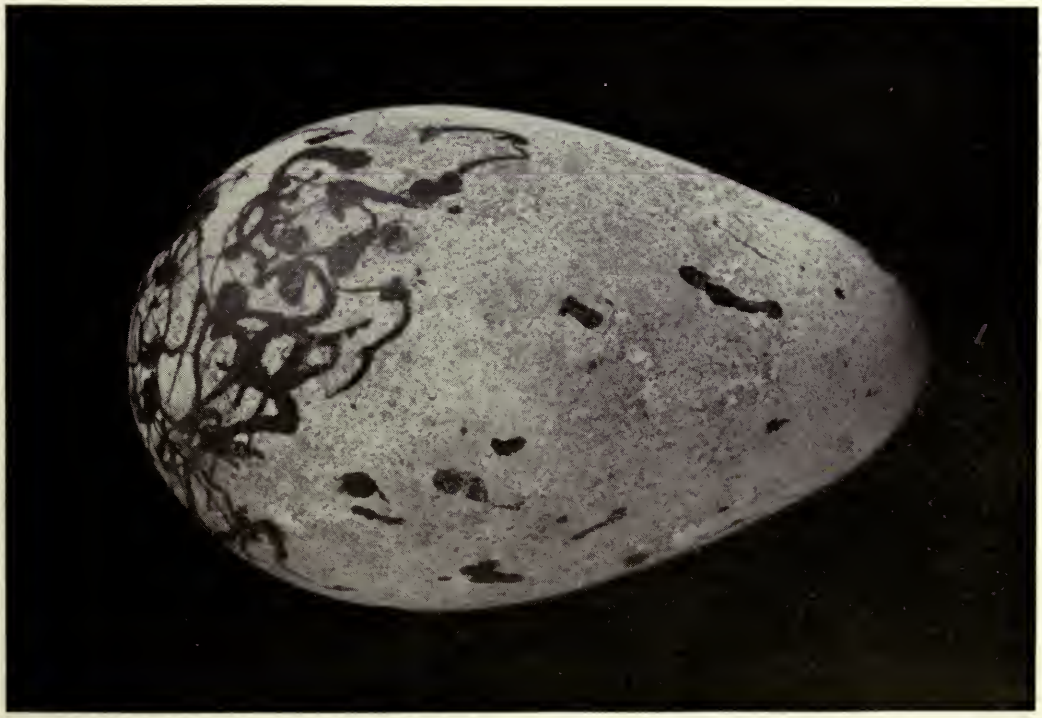

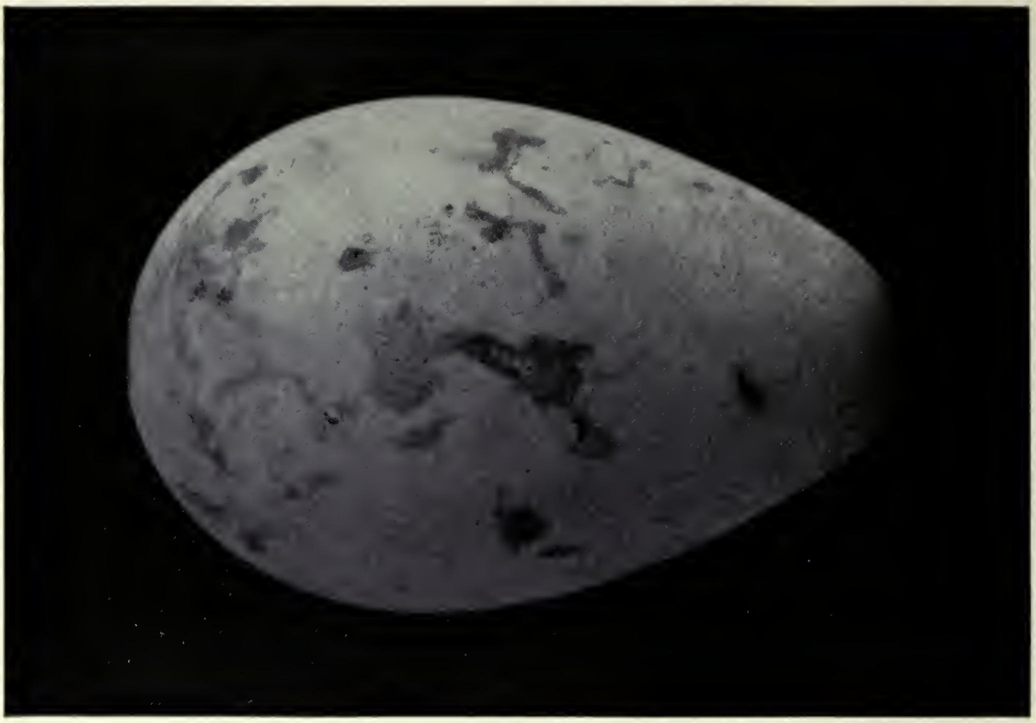

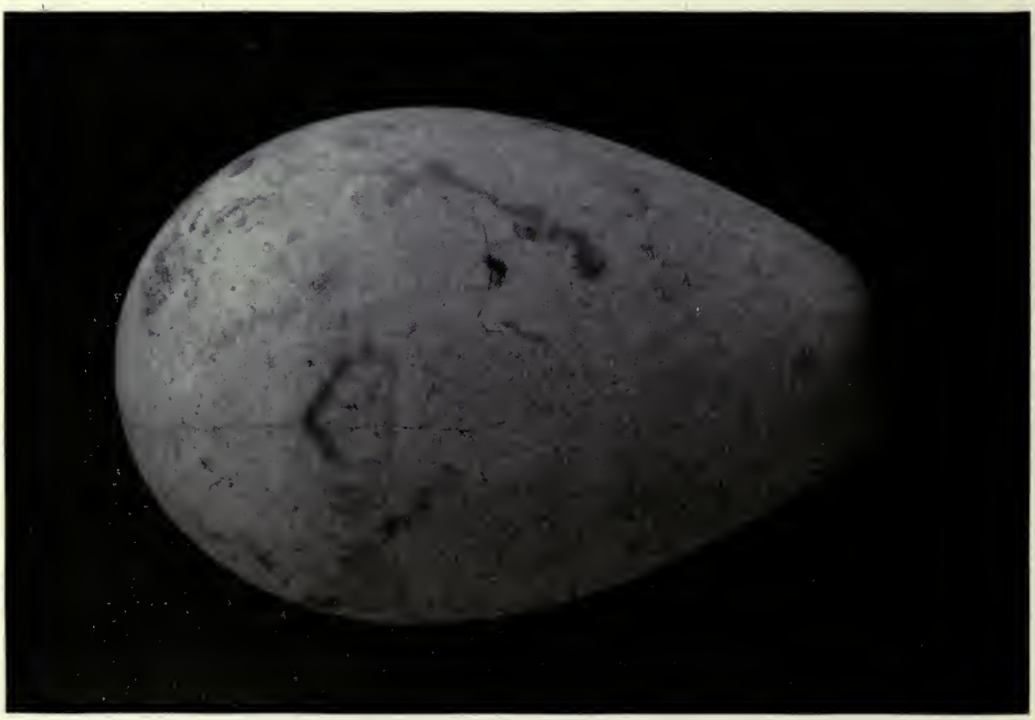

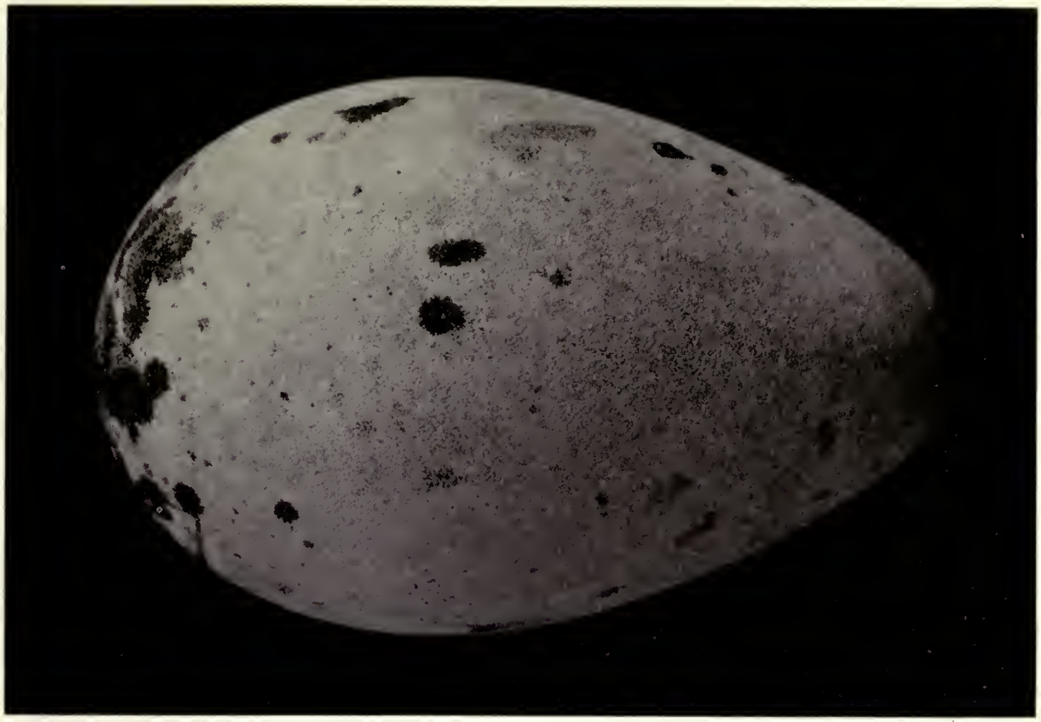

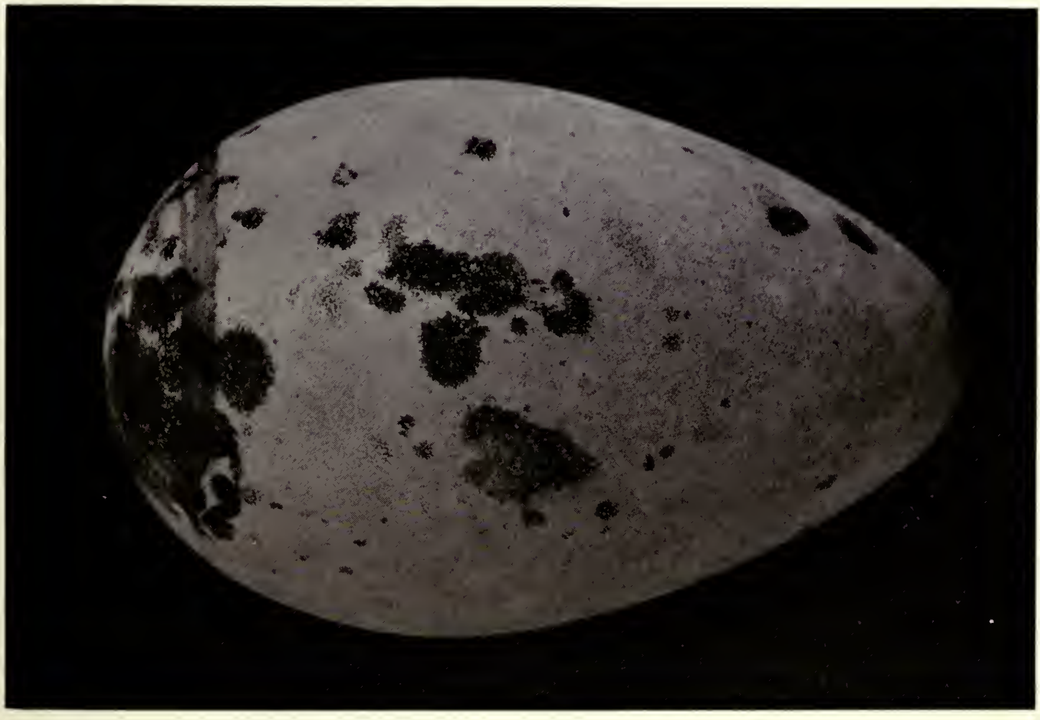

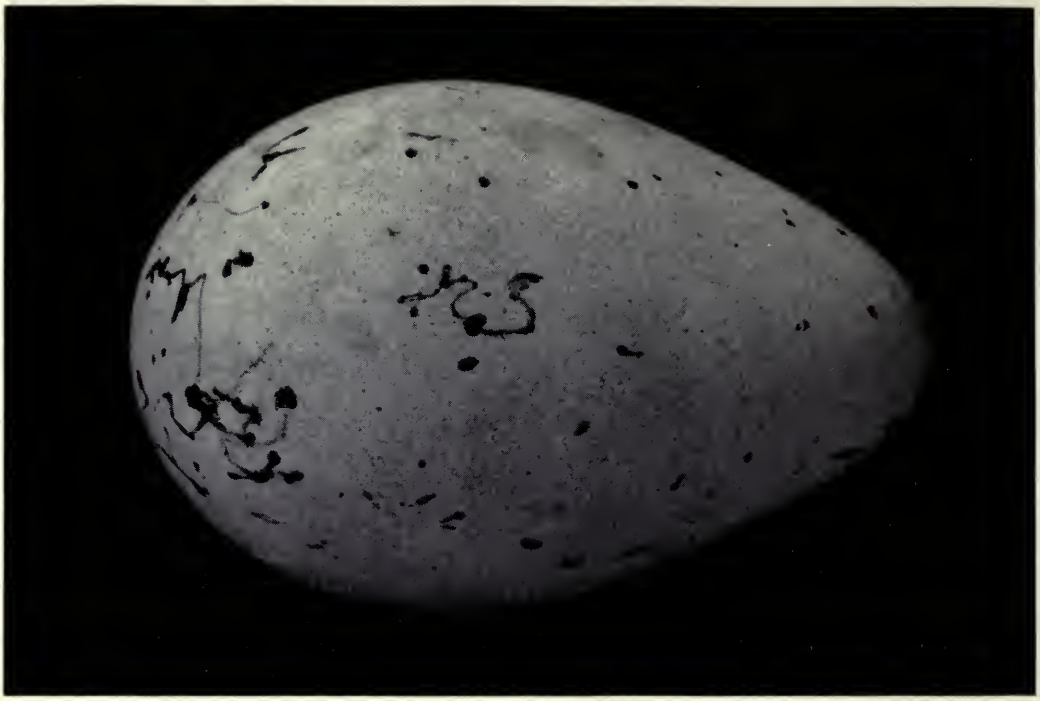

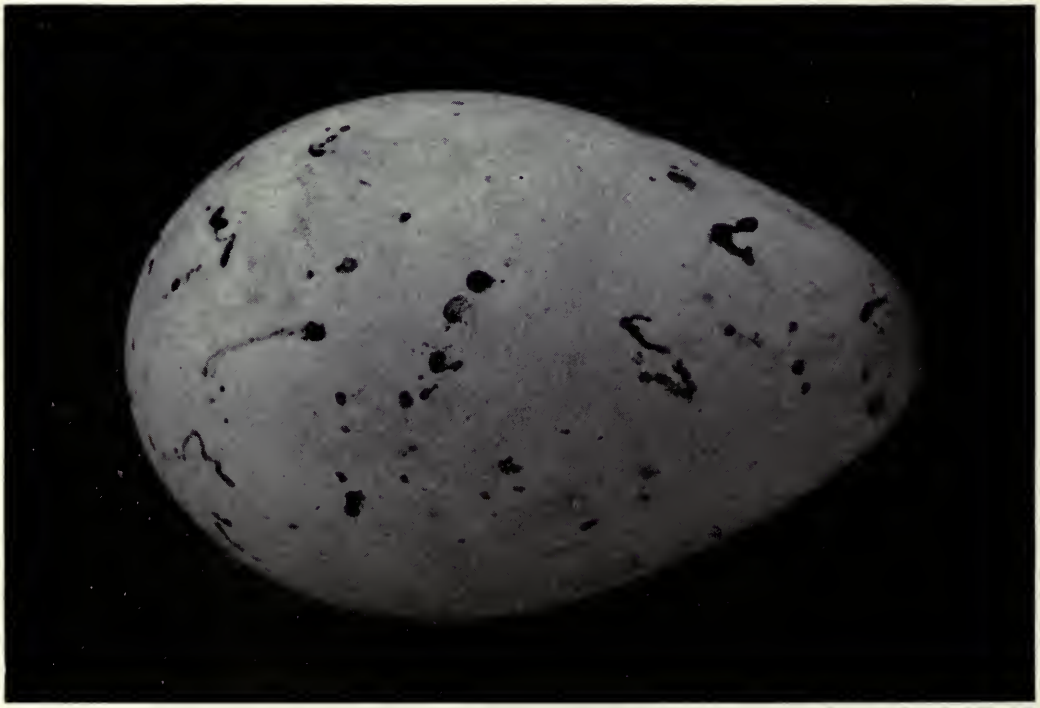

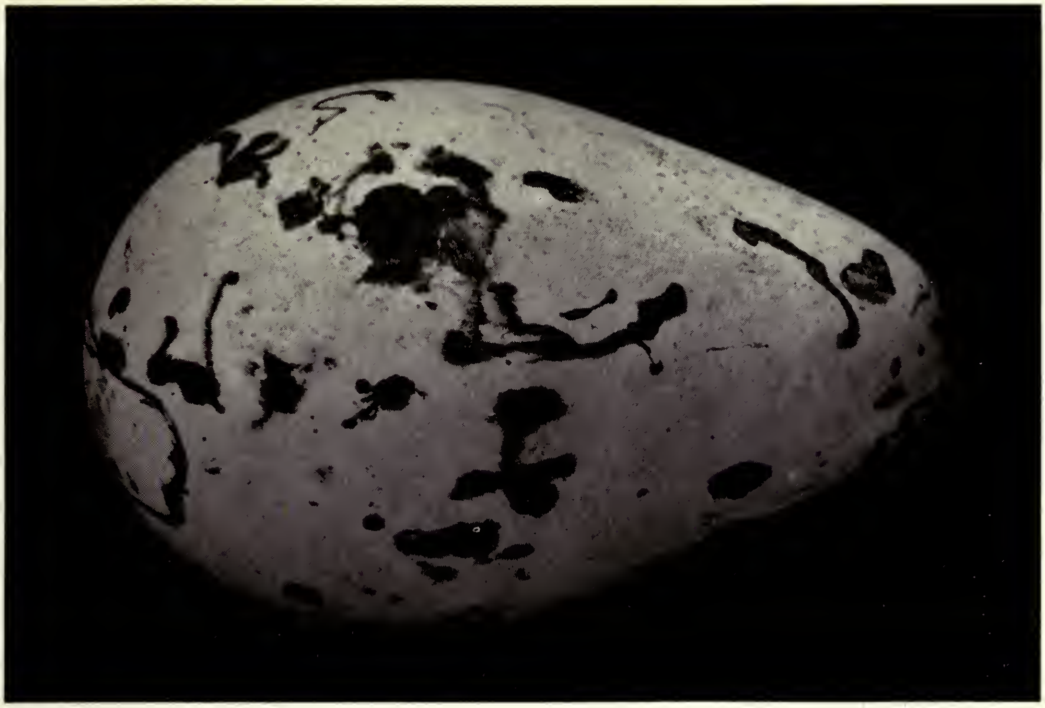

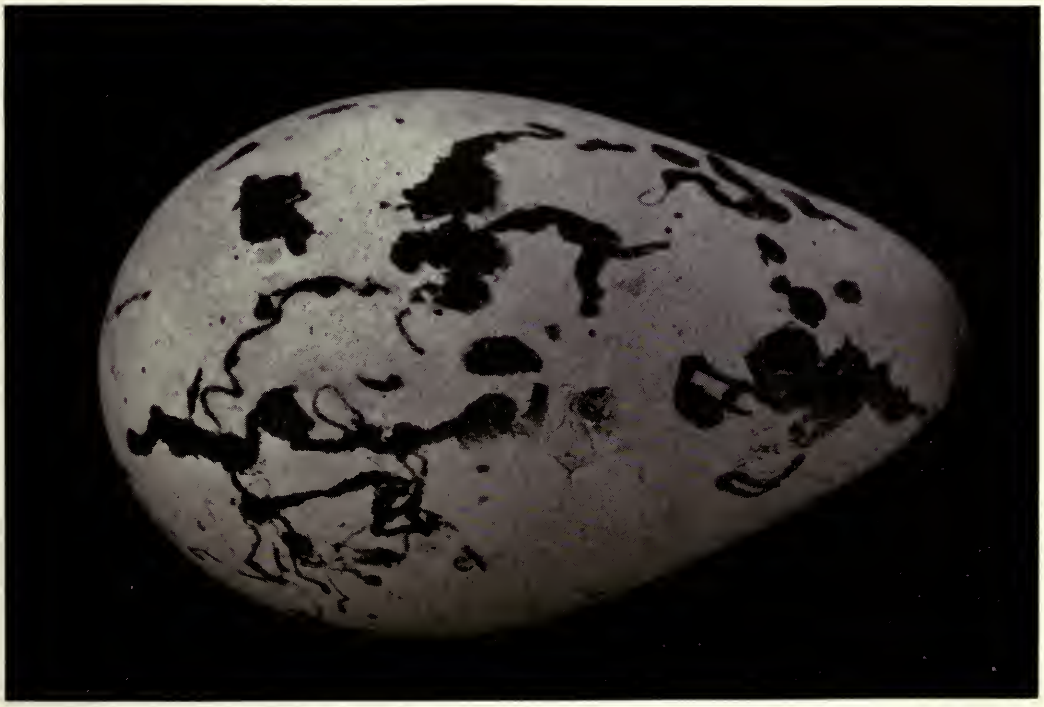

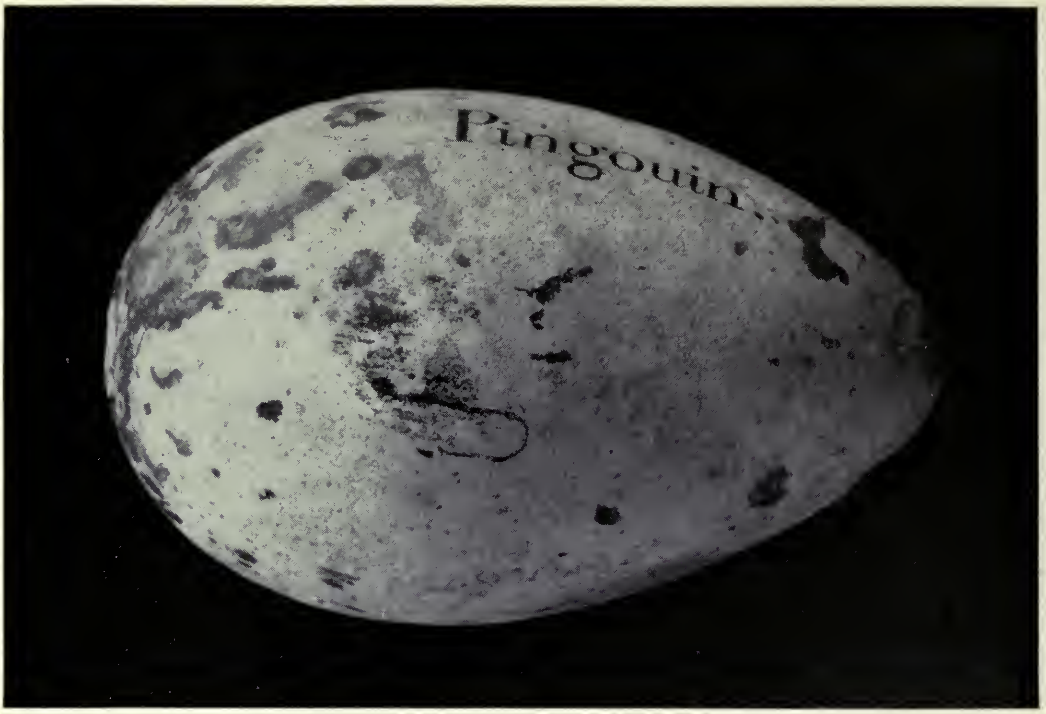
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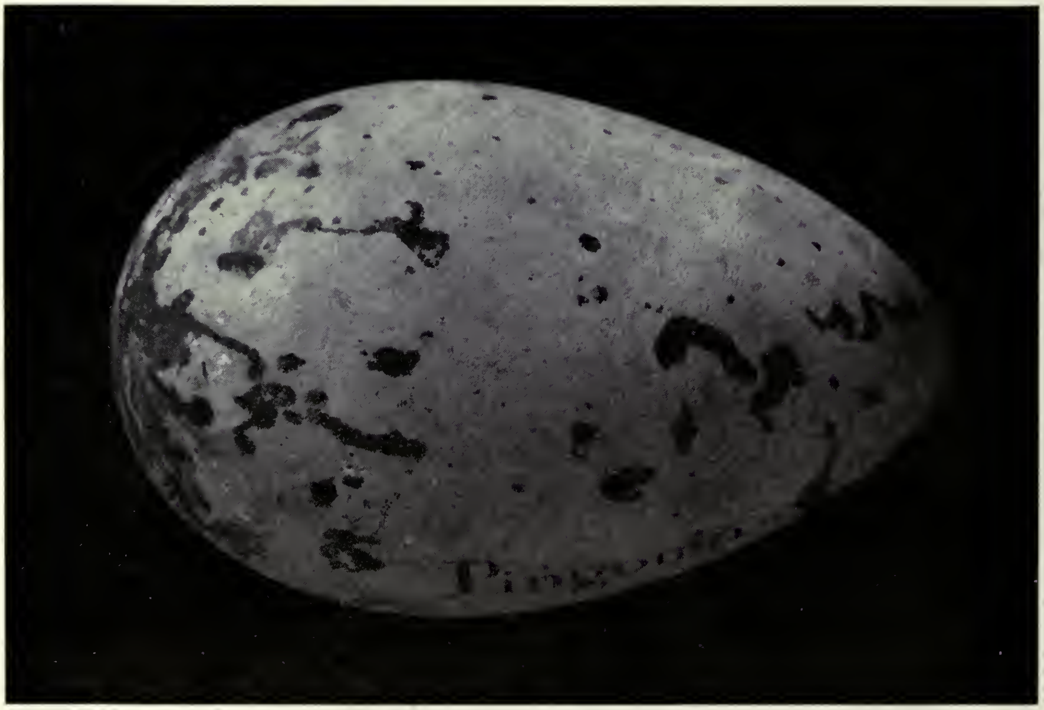

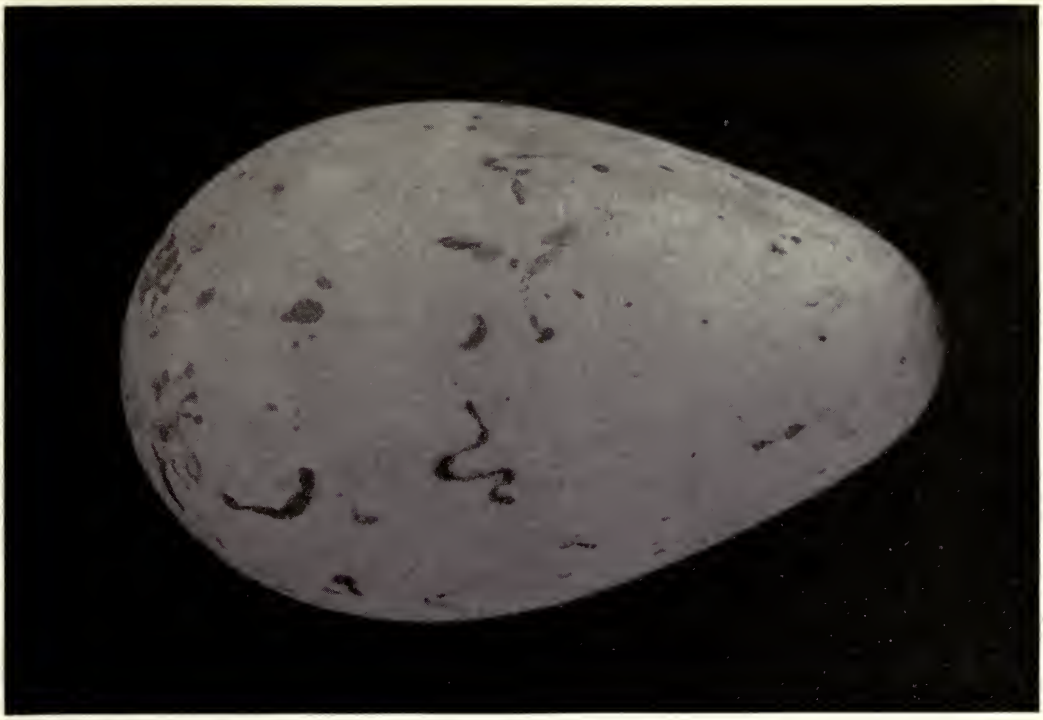

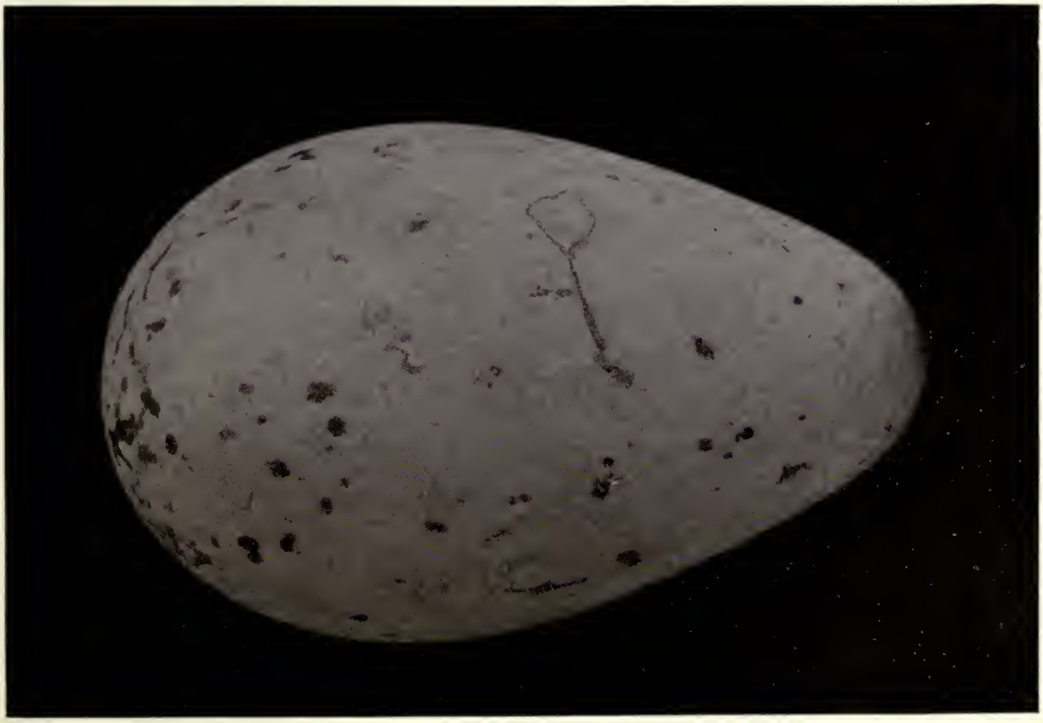

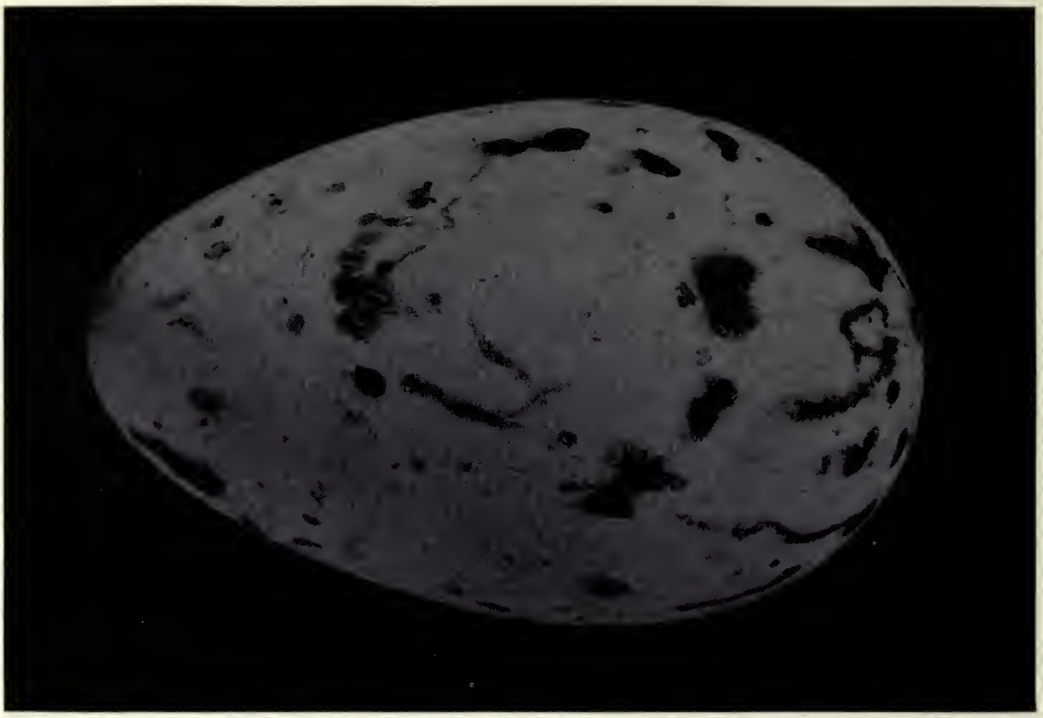

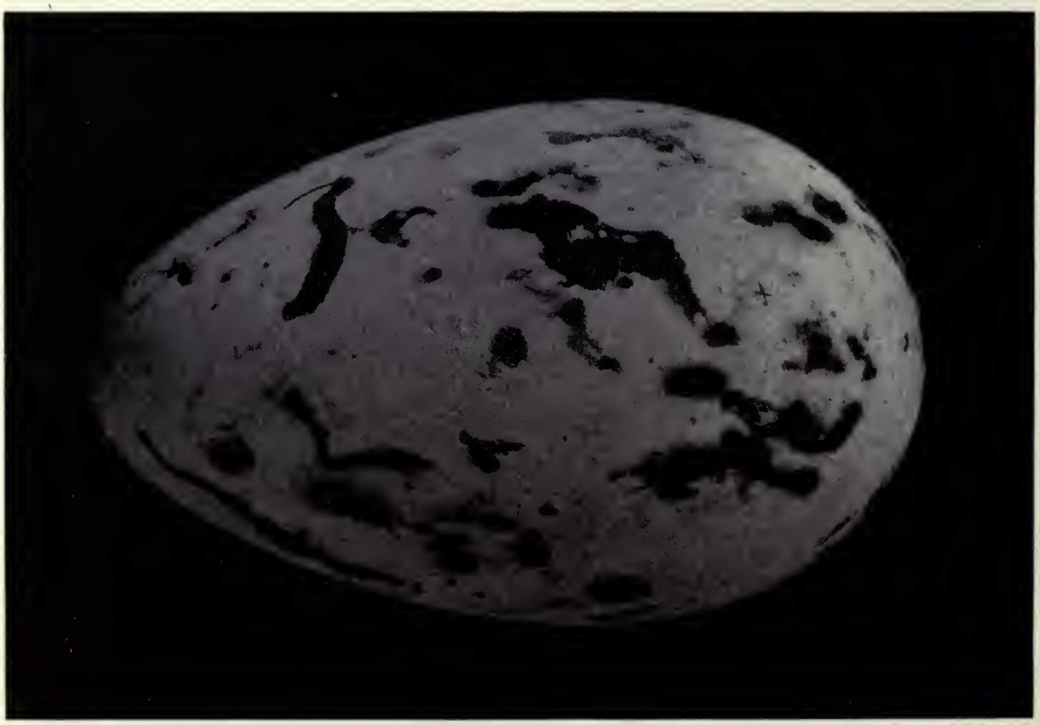

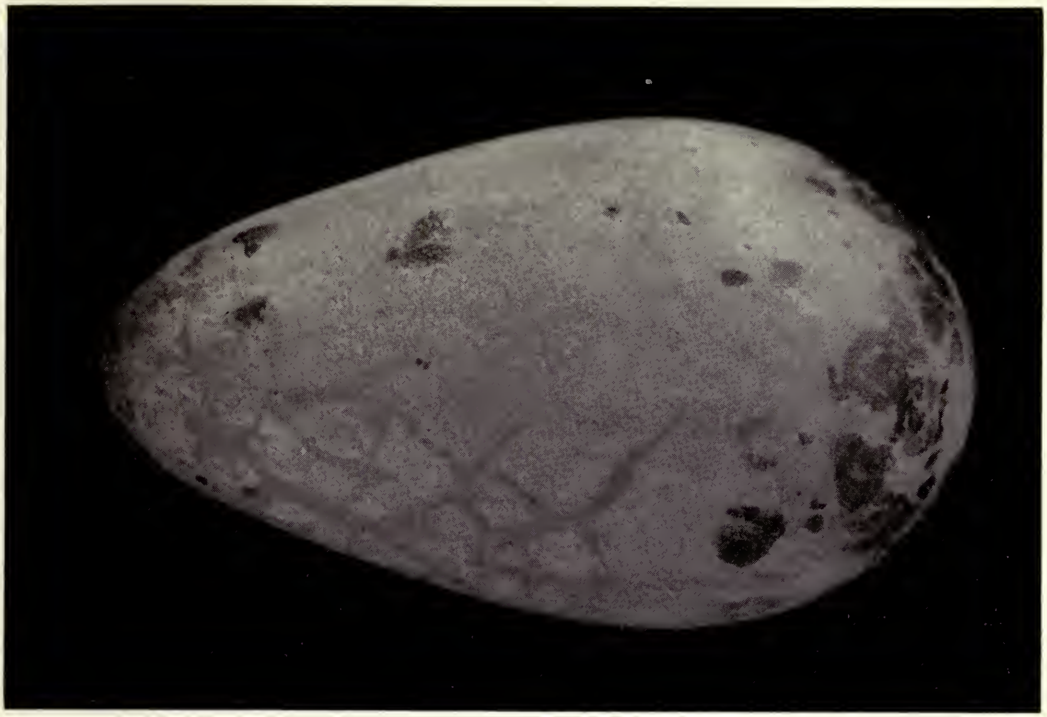

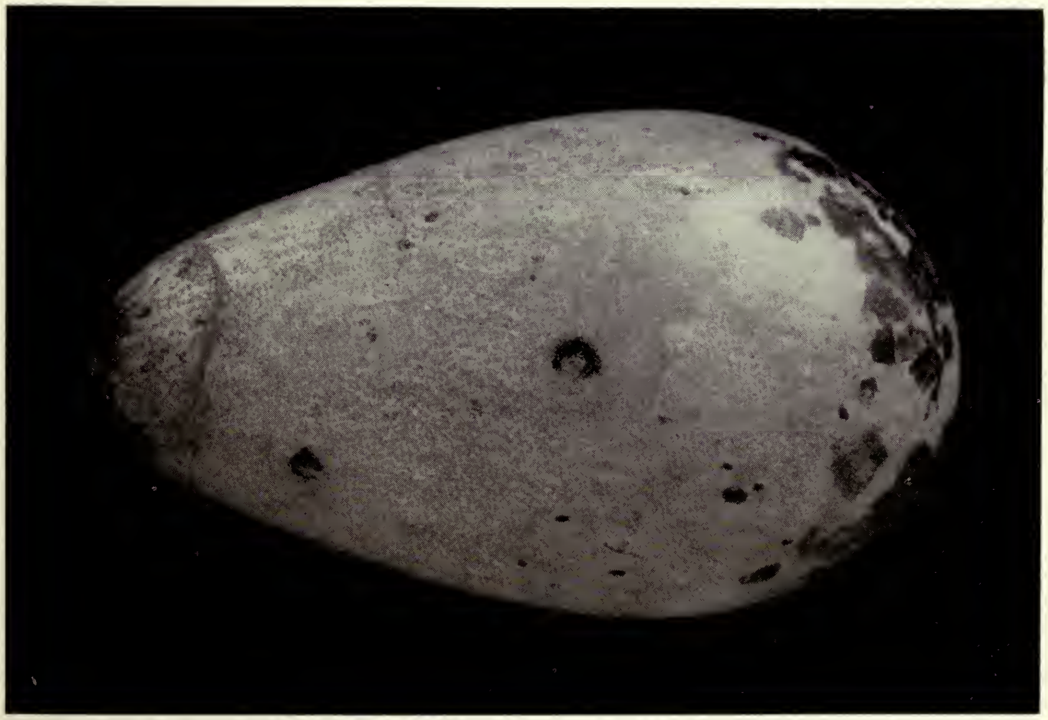

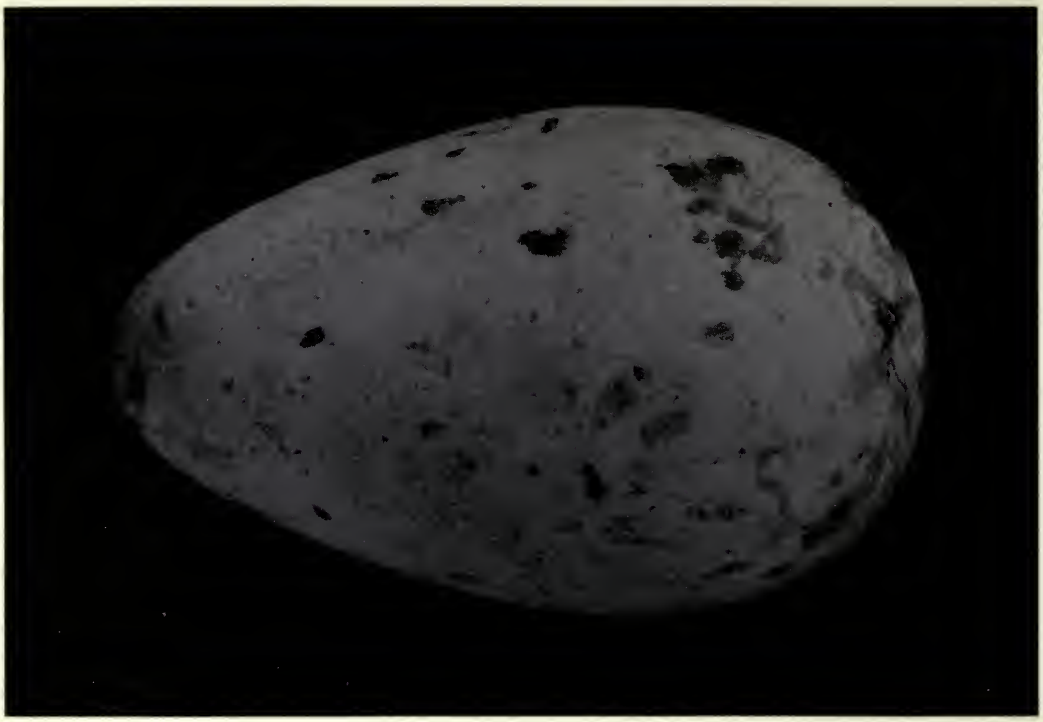

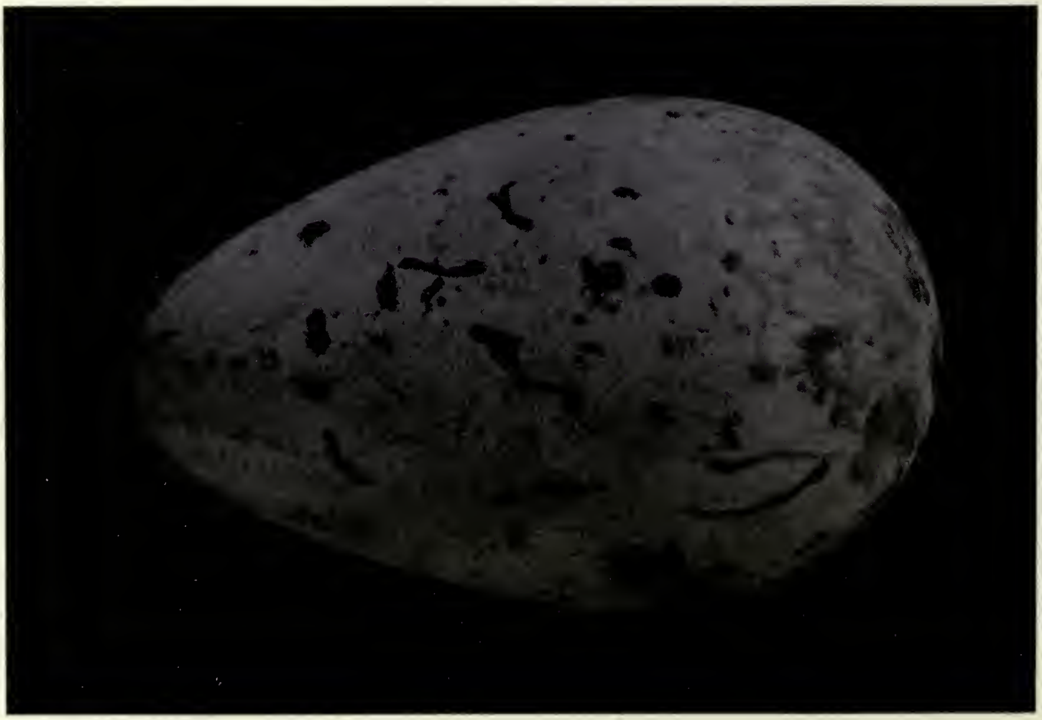

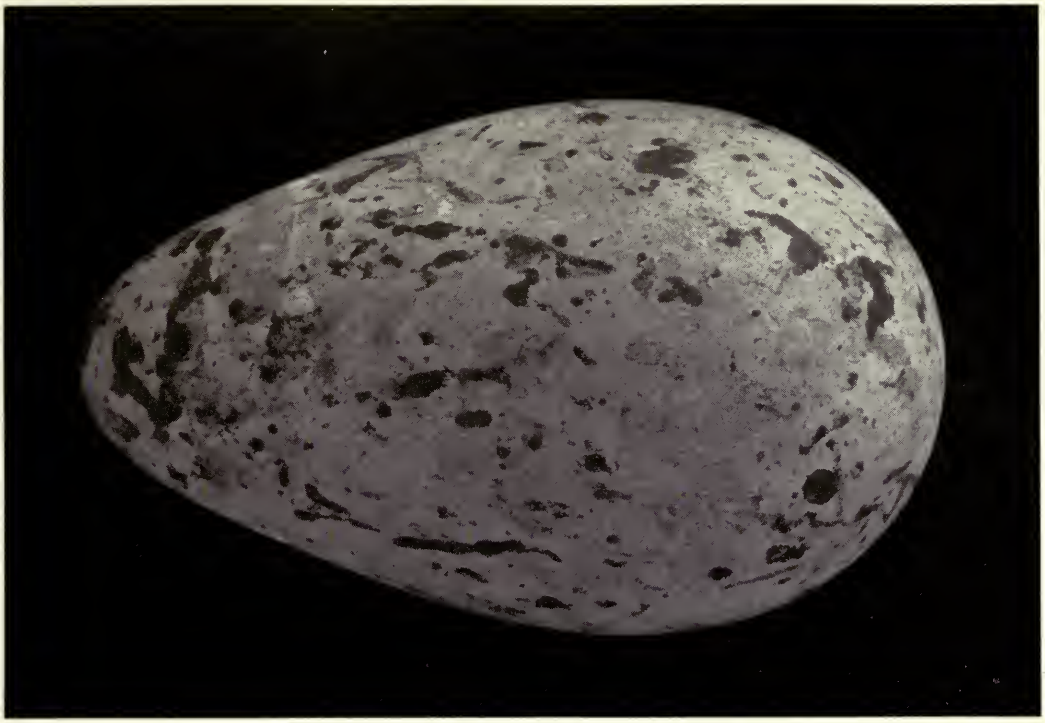

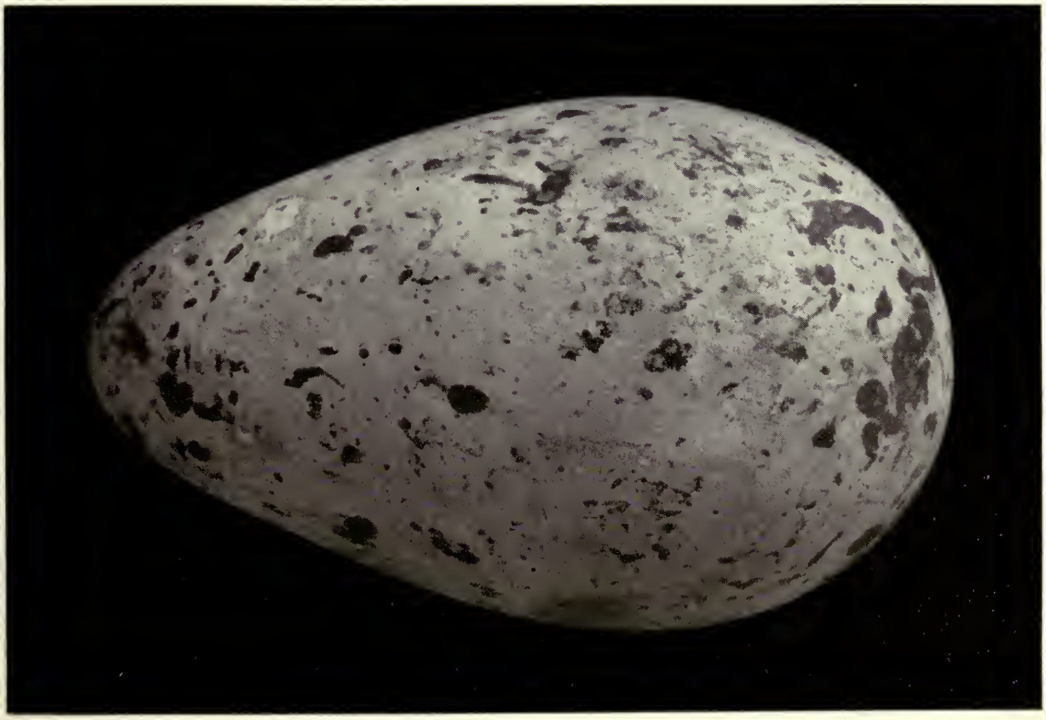

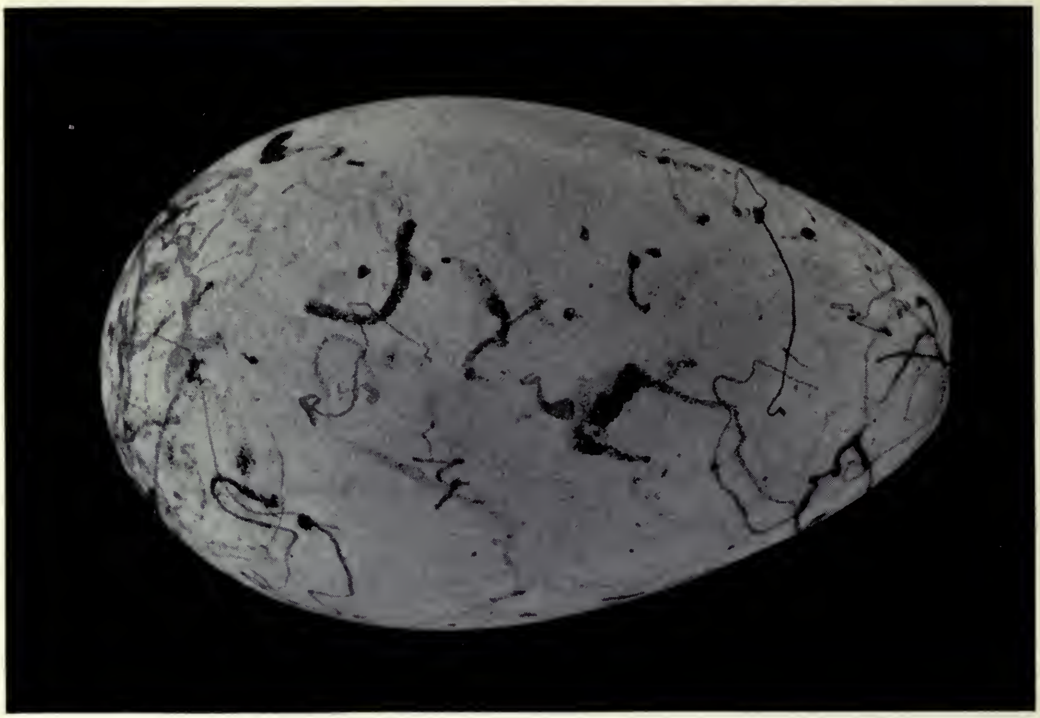

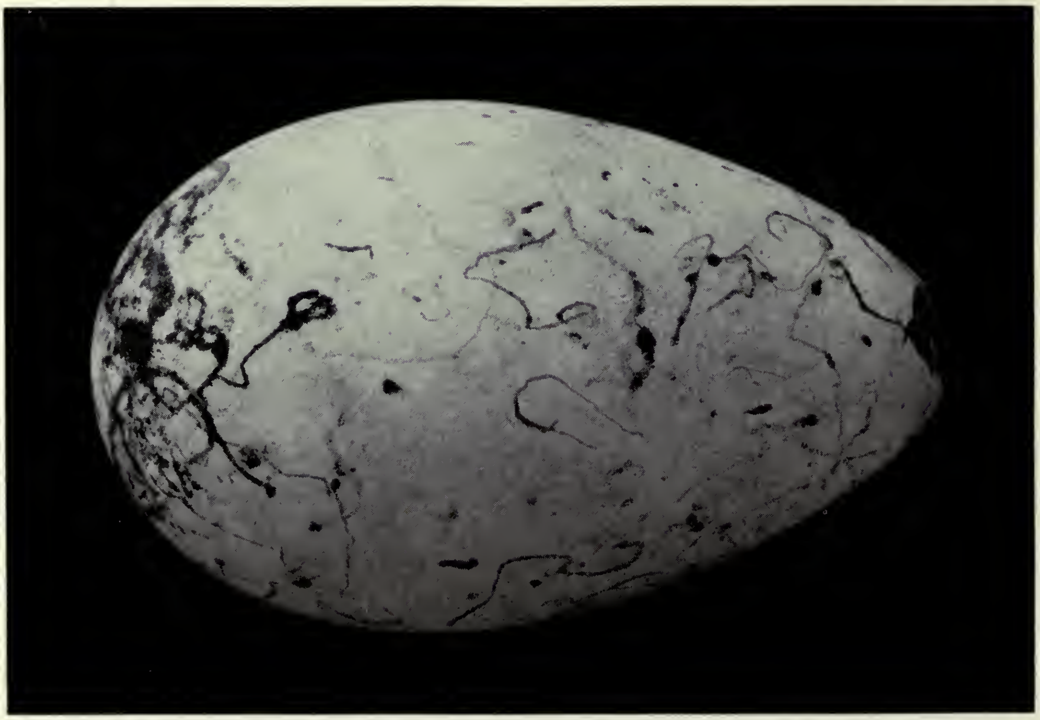

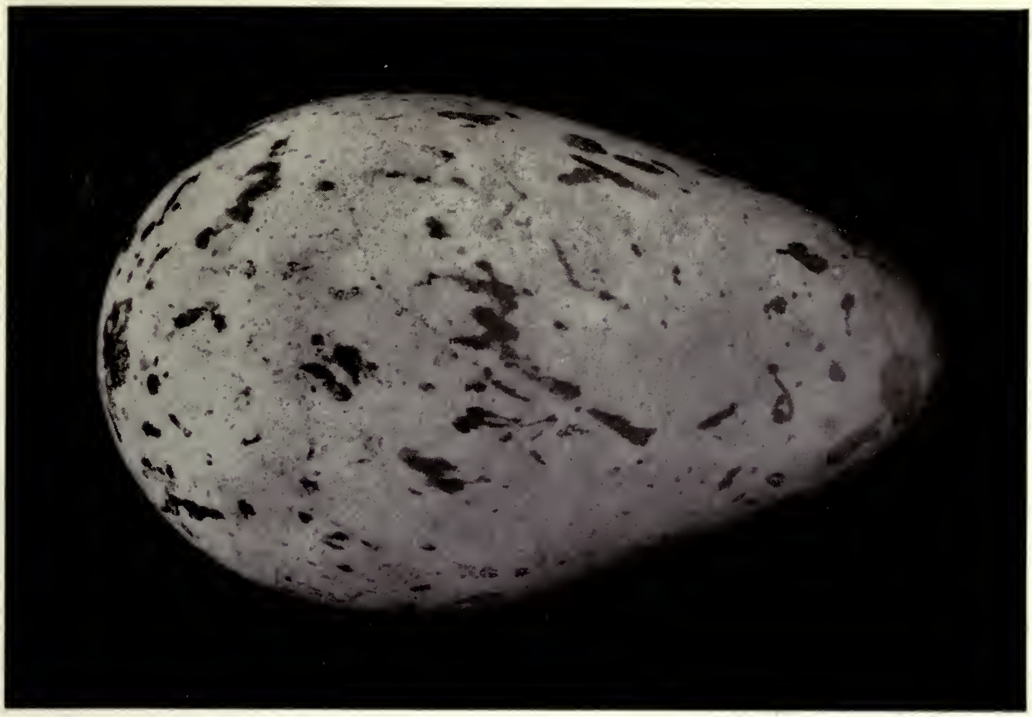

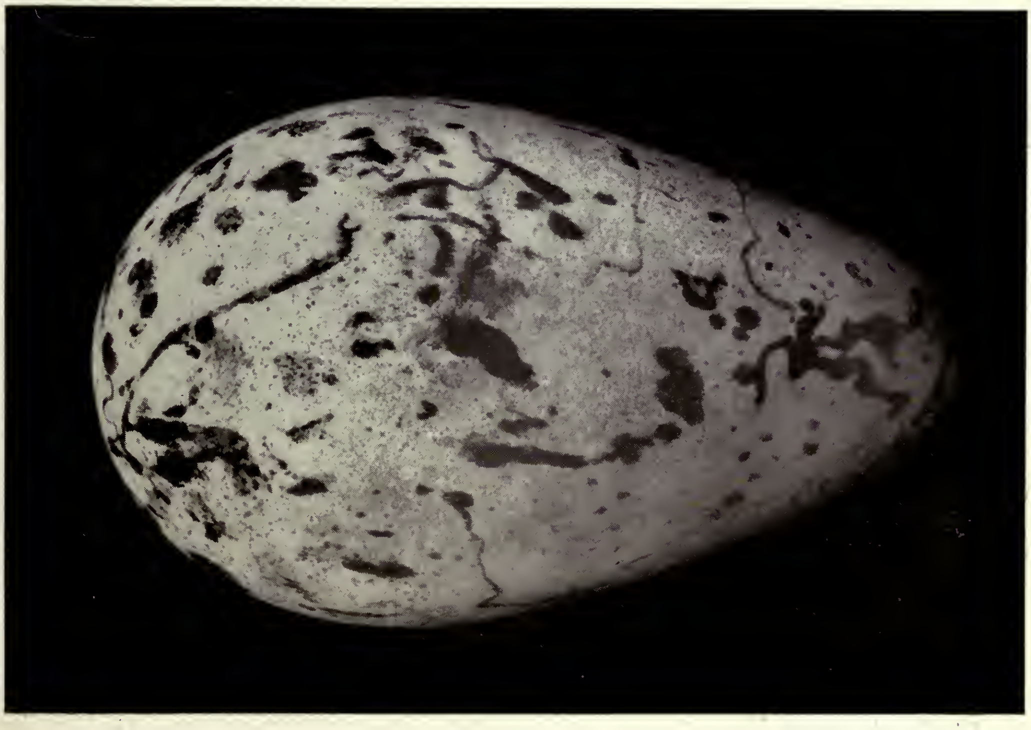

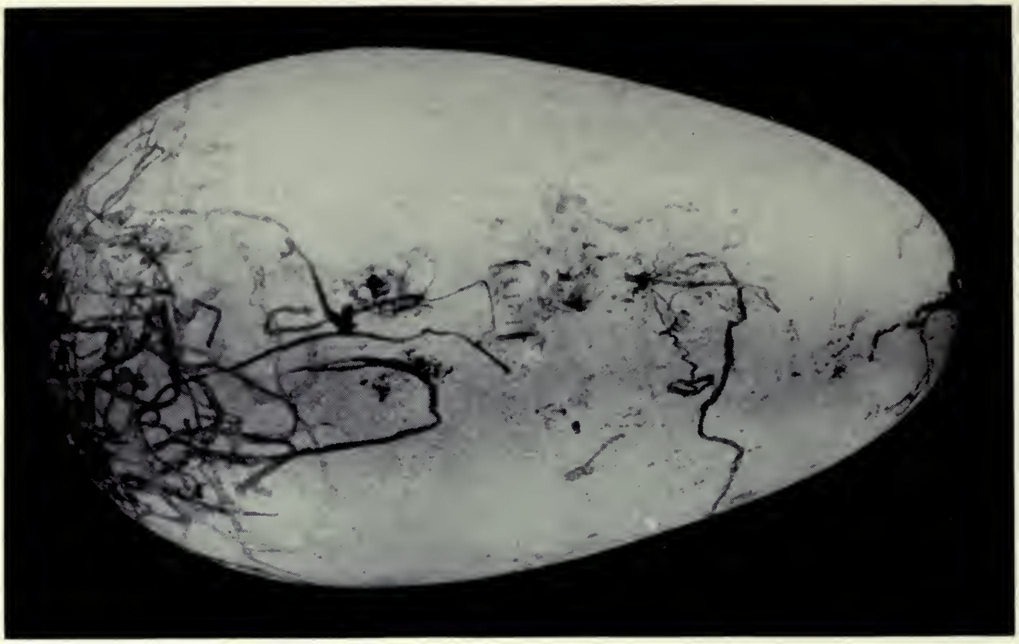

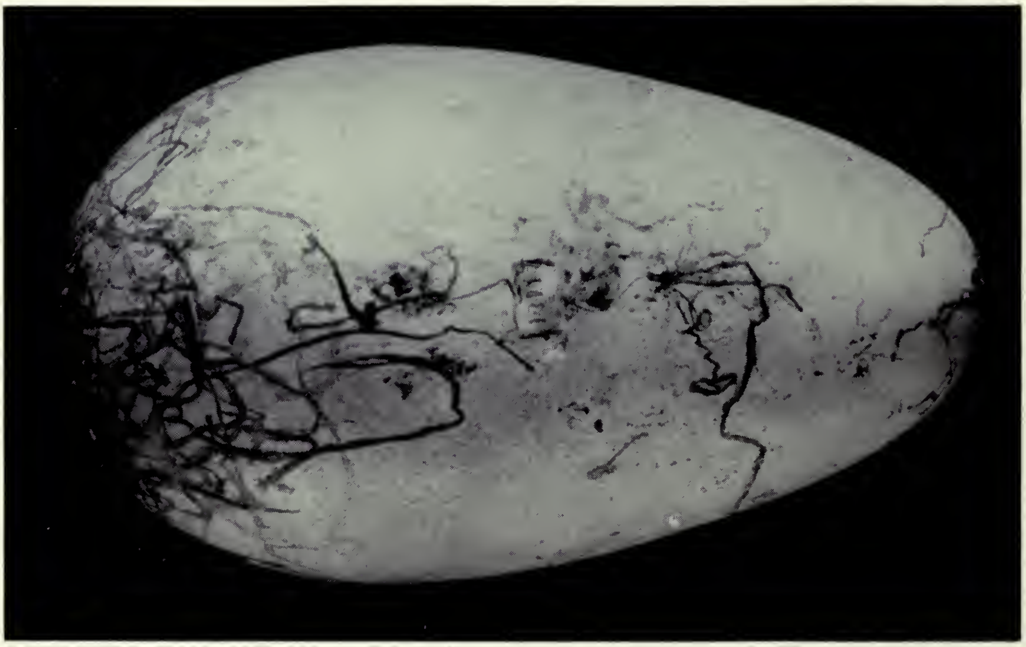

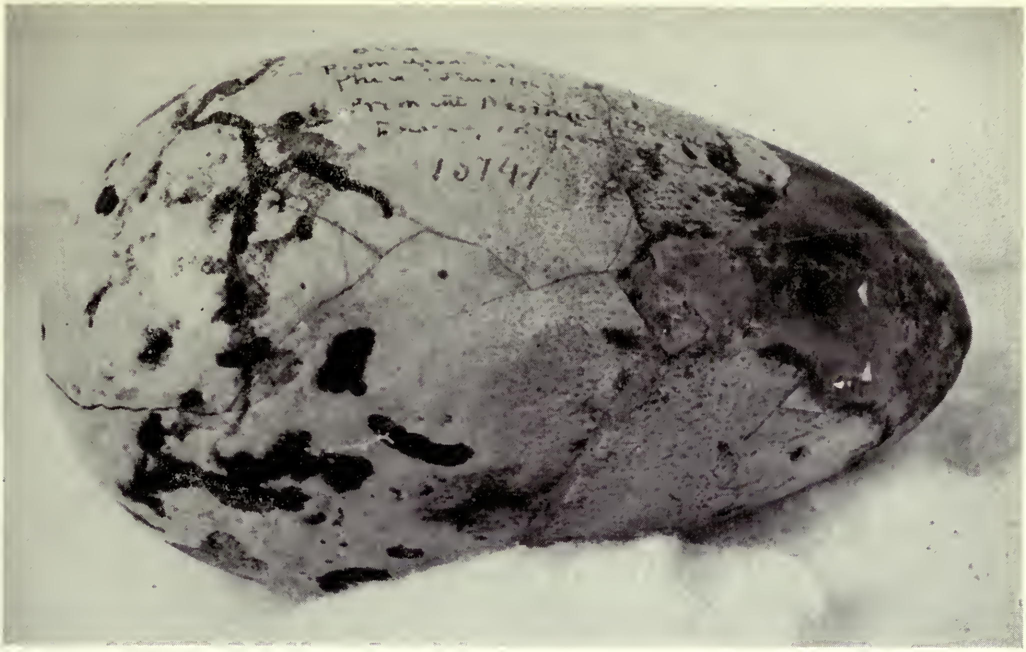
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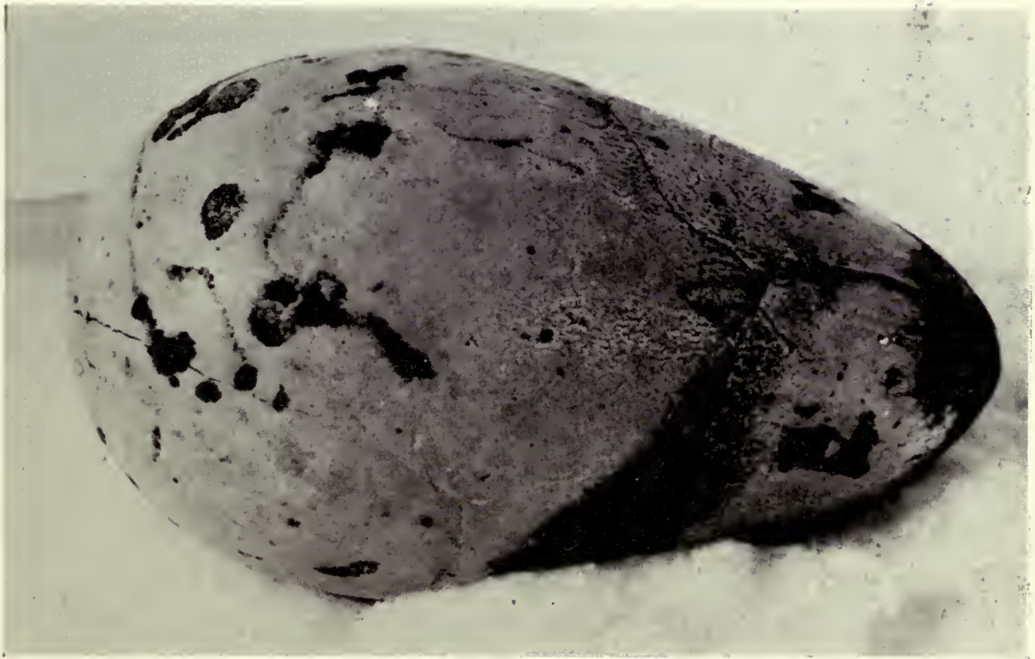

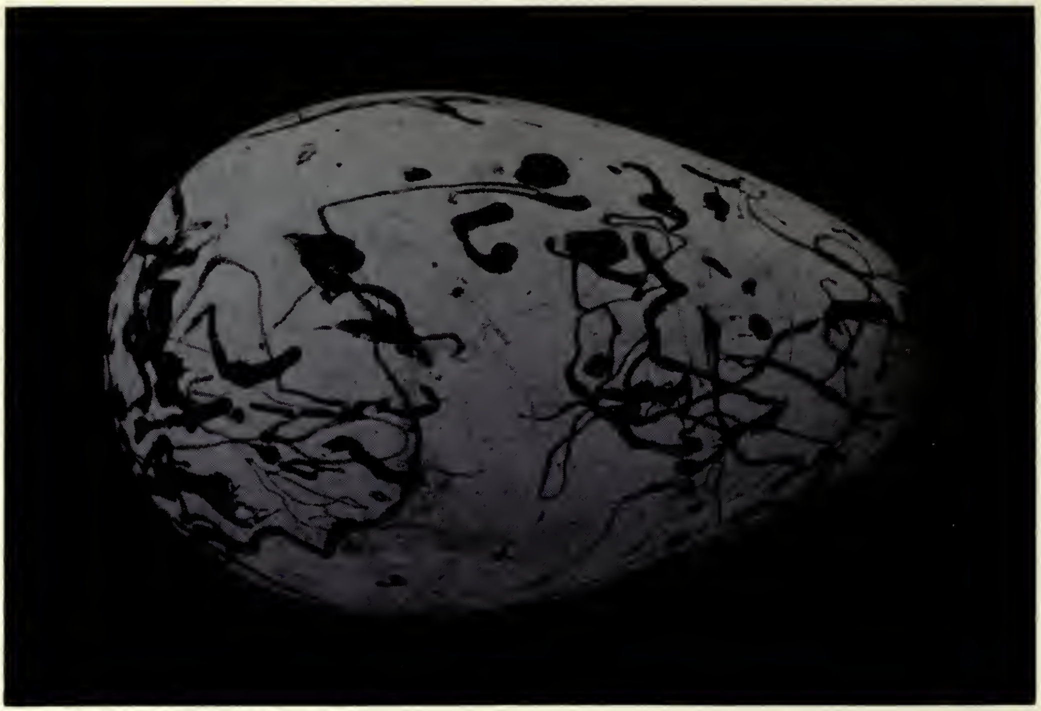

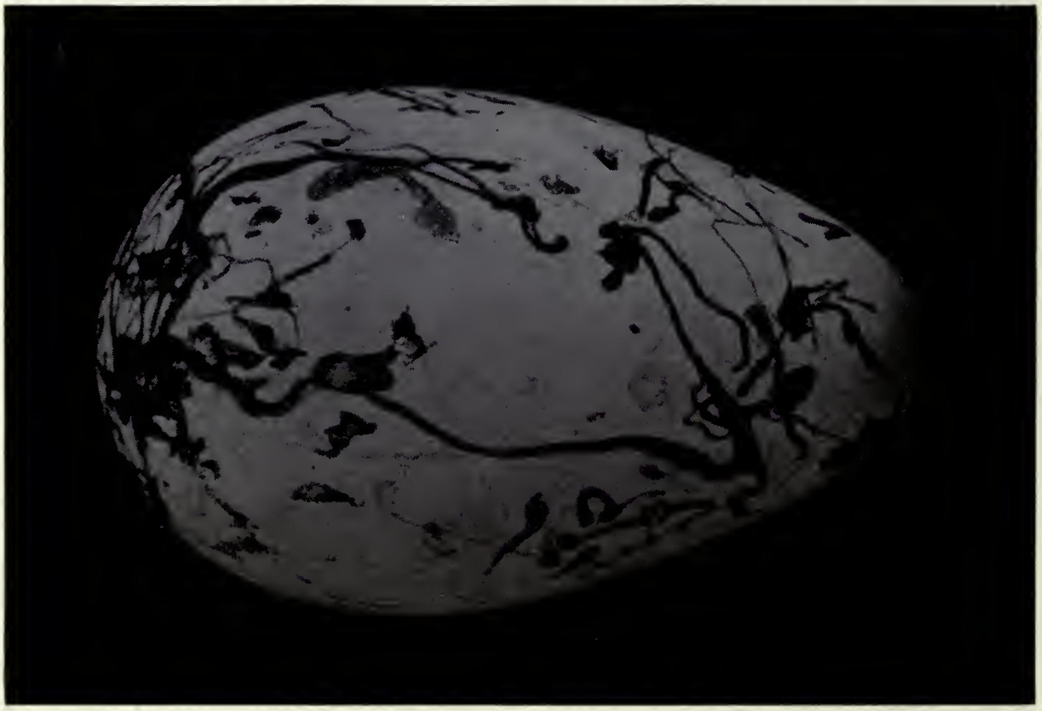

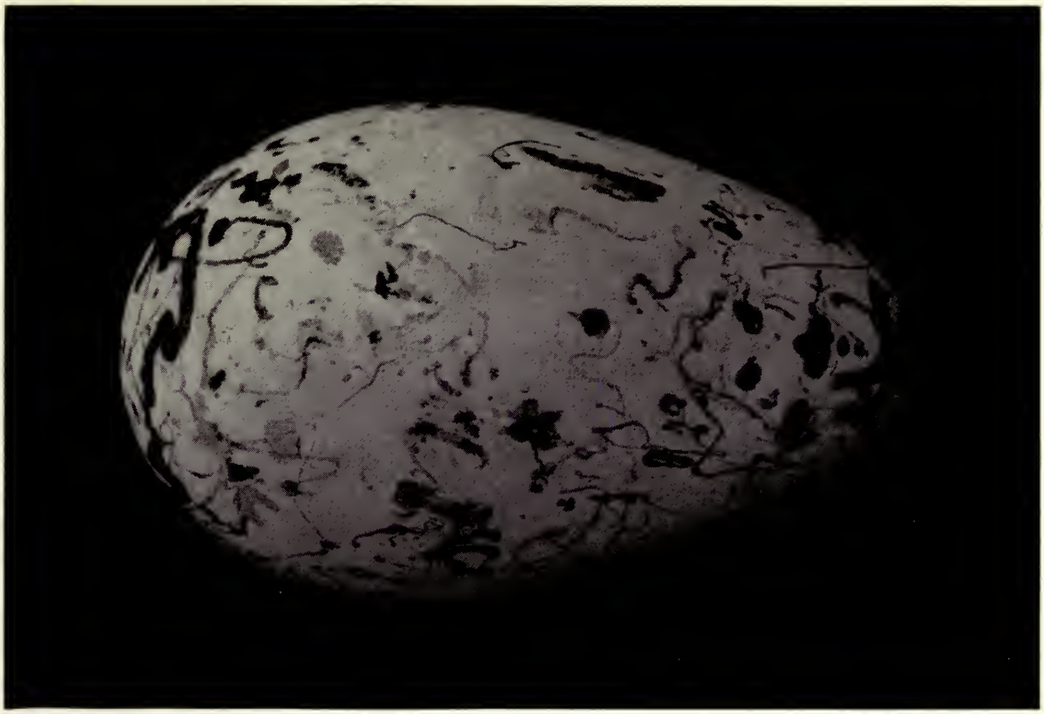

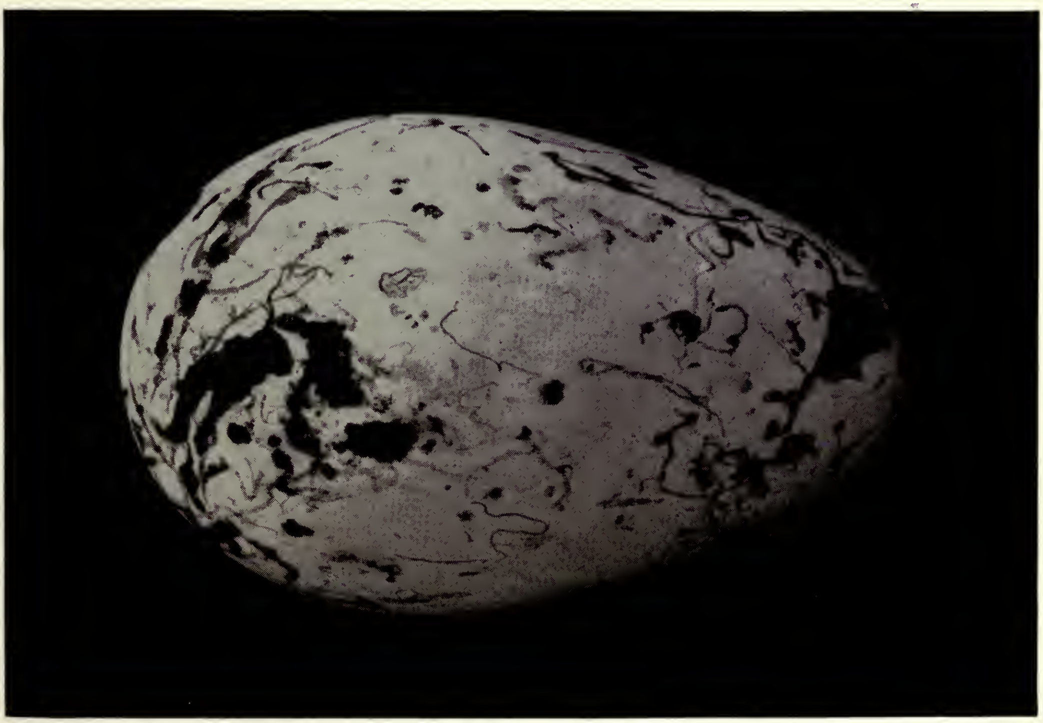

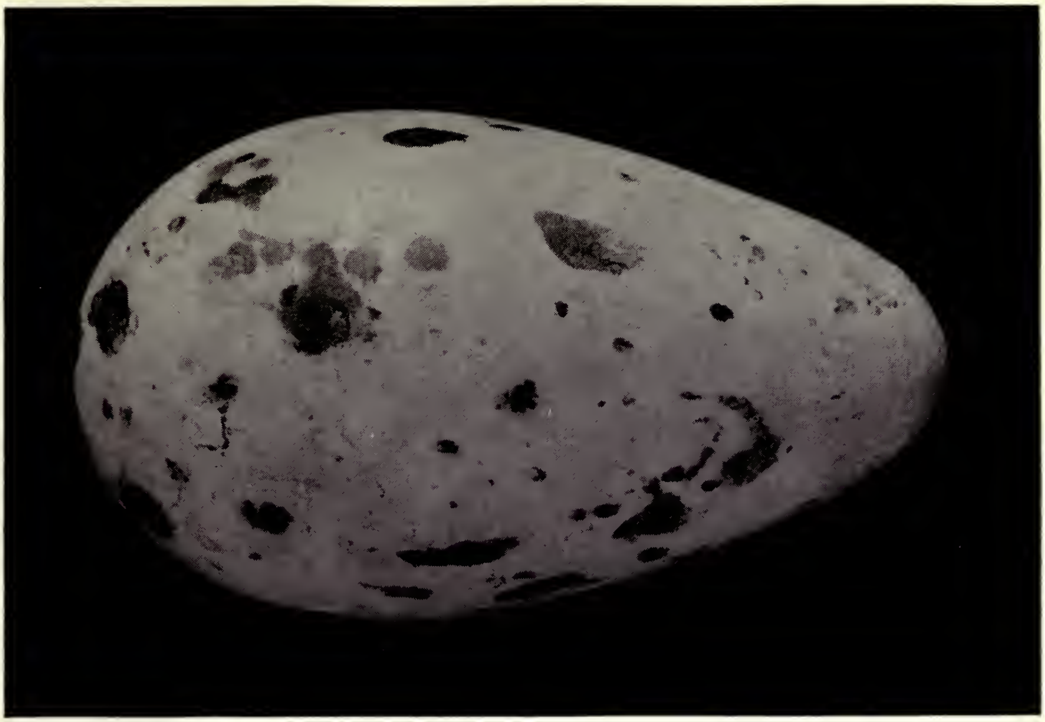

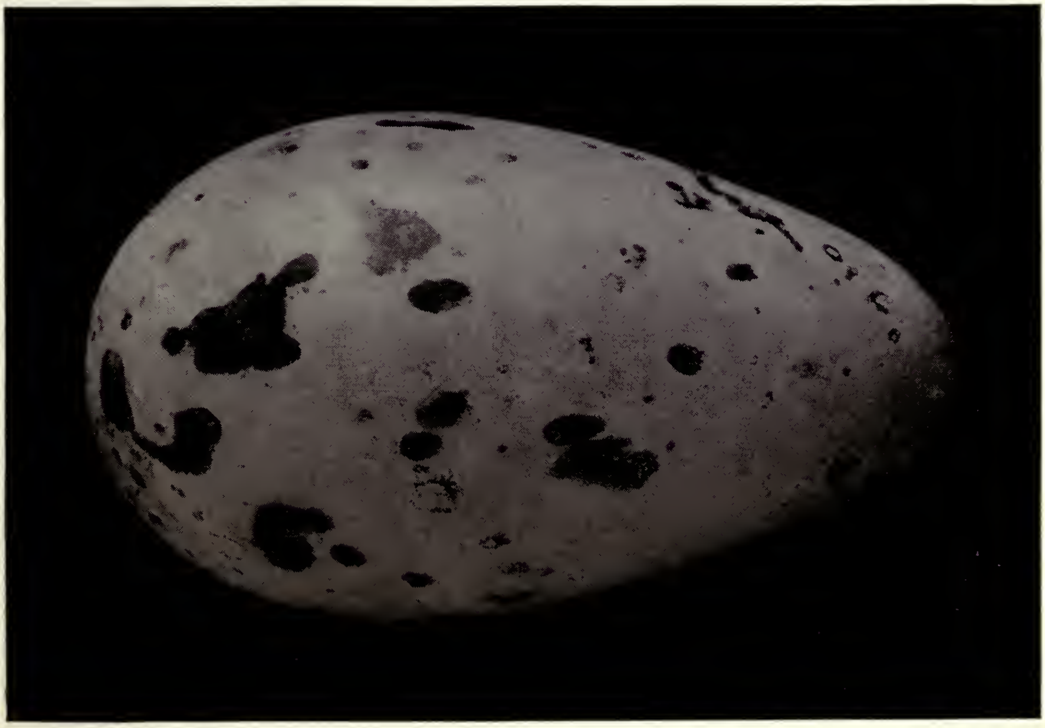

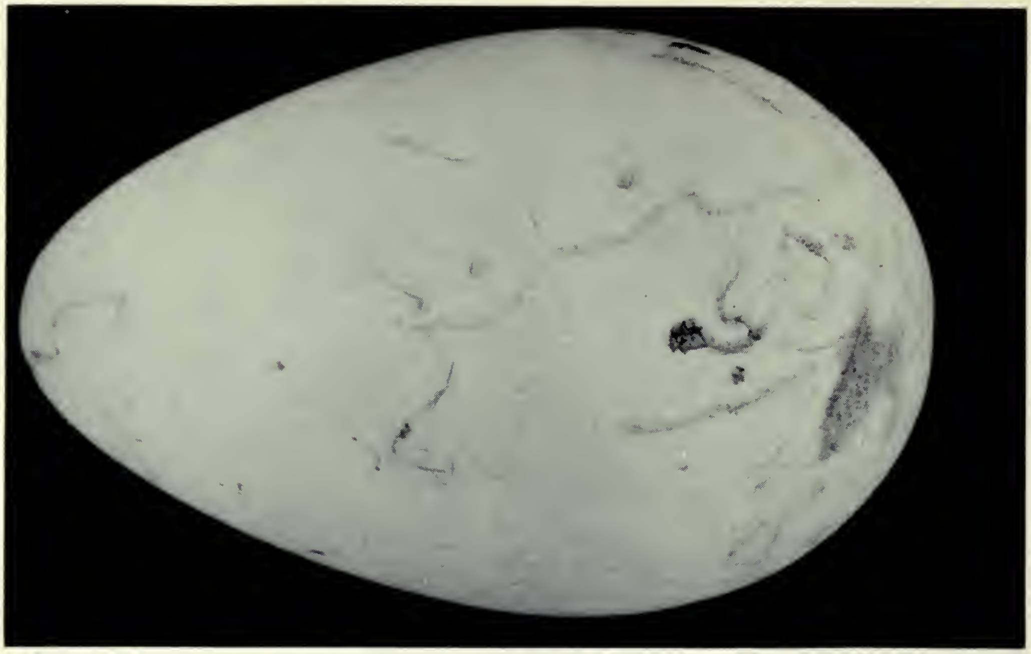

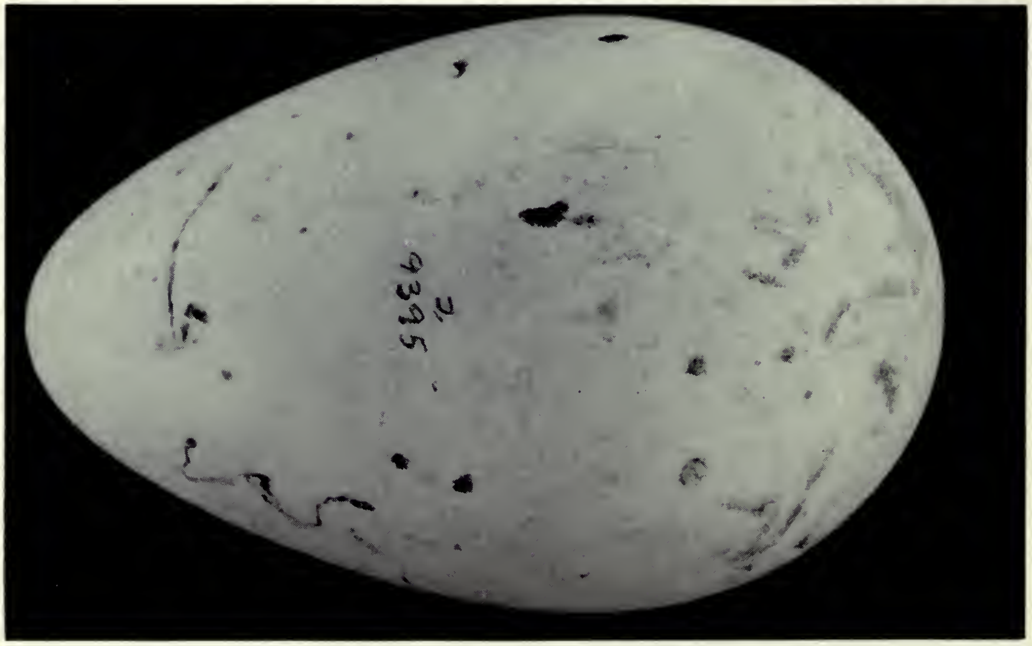
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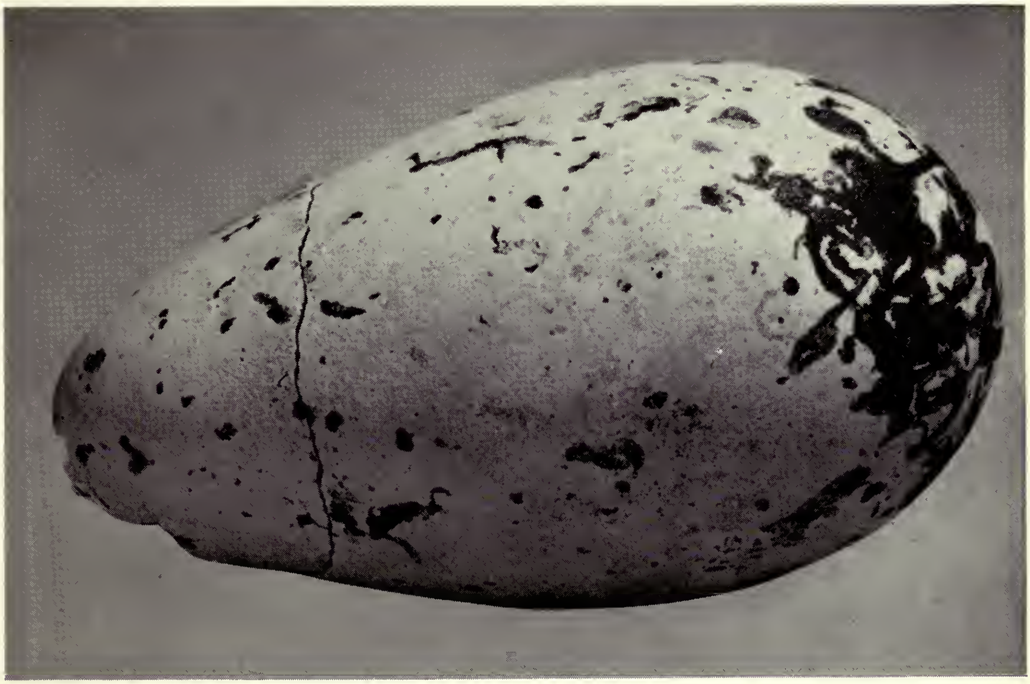

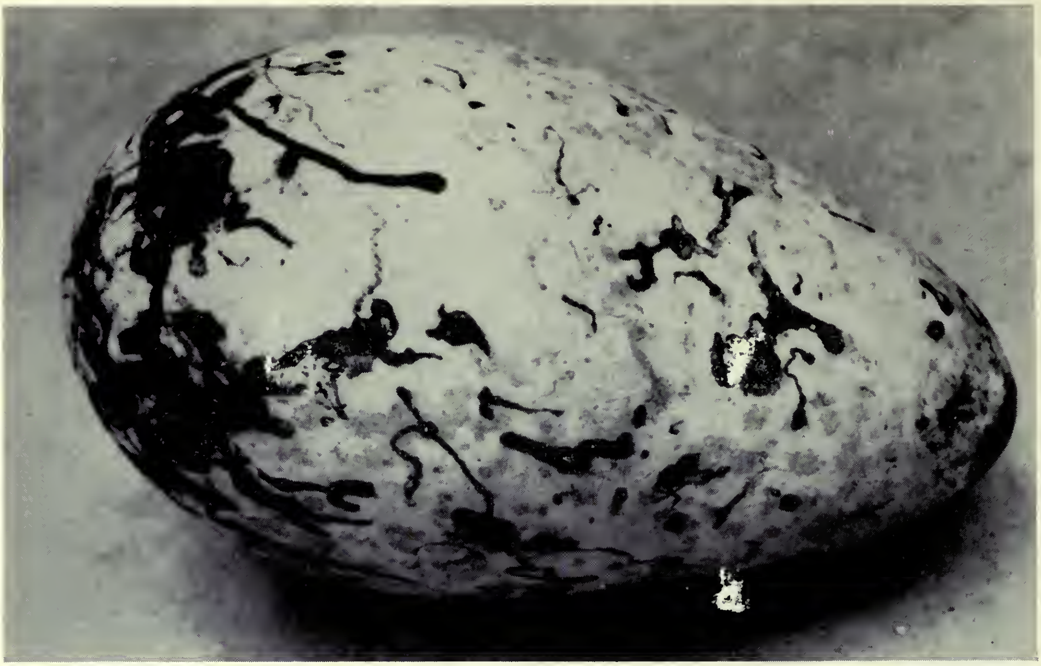

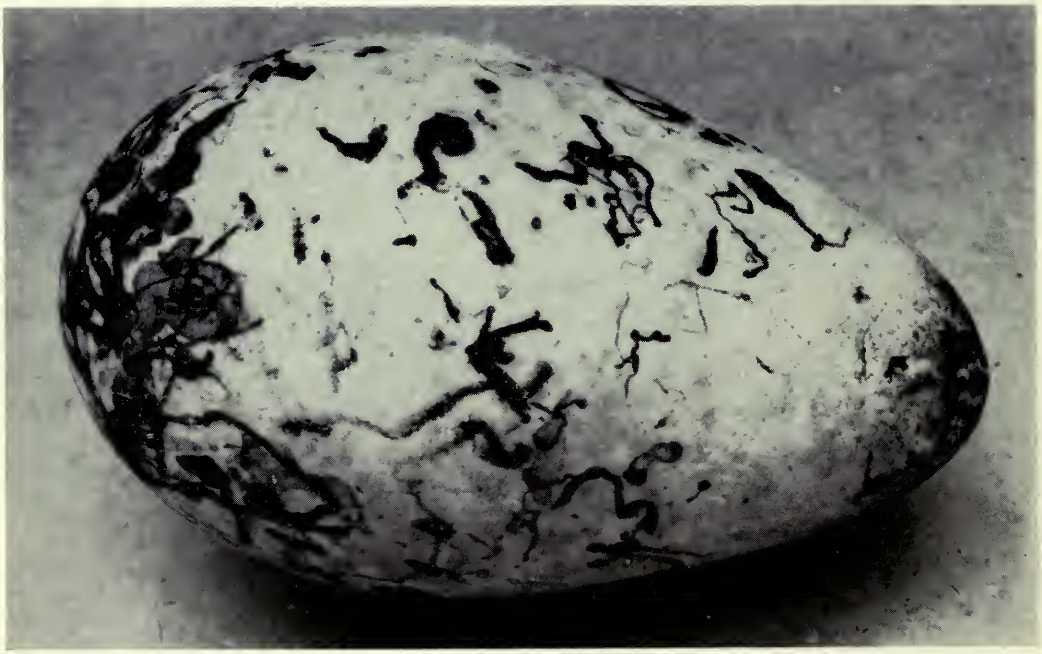

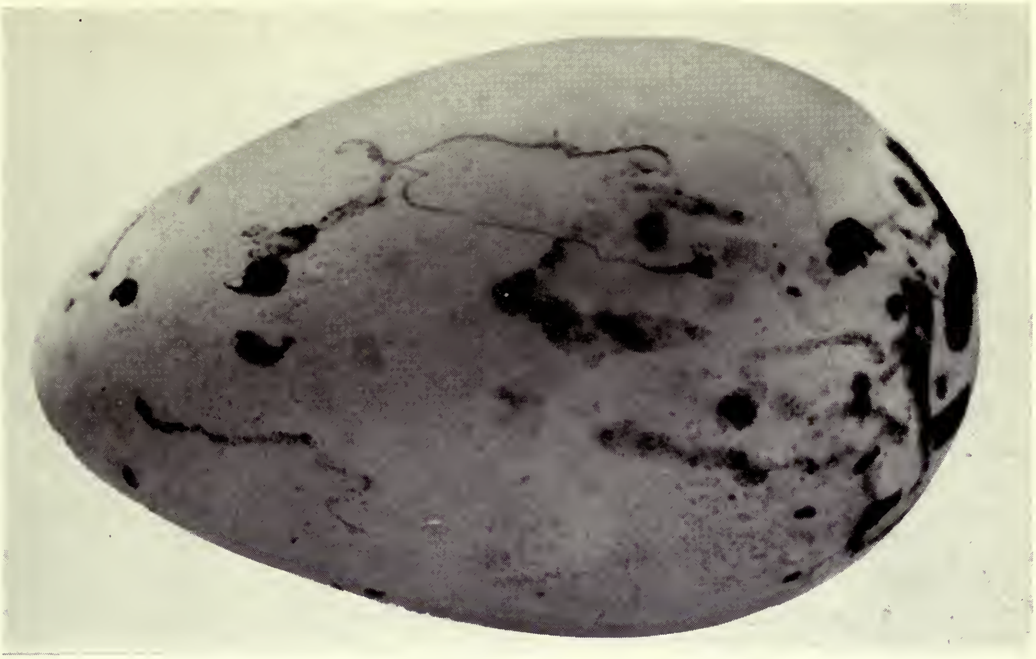

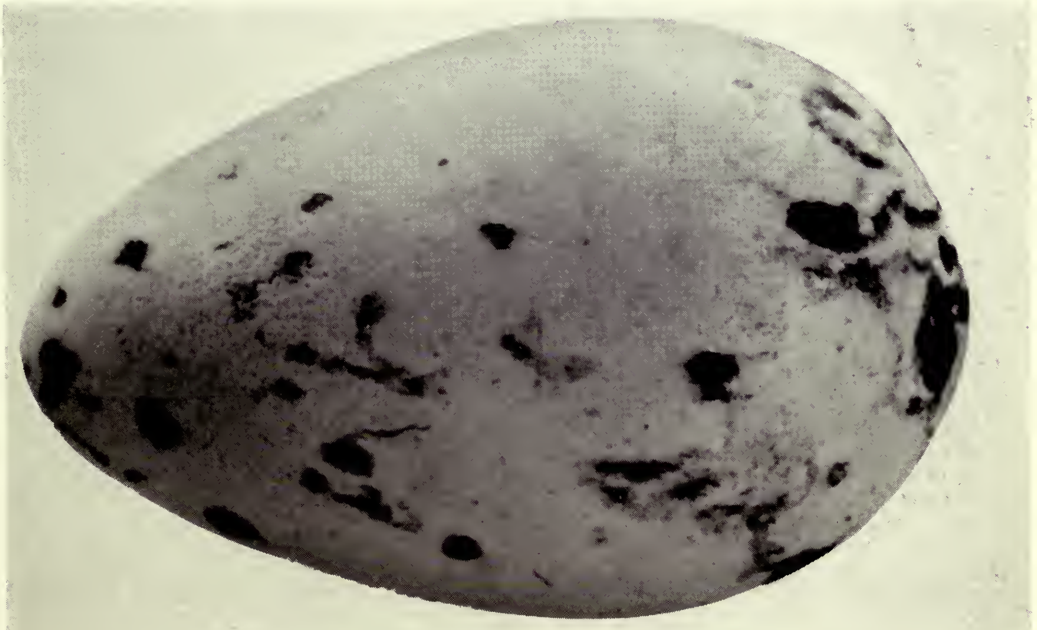

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DARWIN'S NOTEBOOKS ON TRANSMUTATION OF SPECIES. PART VI

PAGES EXCISED BY DARWIN

Edited by
SIR GAVIN DE BEER, M. J. ROWLANDS and
B. M. SKRAMOVSKY

BULLETIN OF
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Pp. 129–176

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

In 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

This paper is Vol. 3, *No.* 5 *of the Historical series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

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INTRODUCTION

It was explained in the Introduction to Darwin's First Notebook on Transmutation of Species, that his method of working, when preparing to write his large book on Natural Selection which never appeared, but of which the *Origin of Species* was an abstract, was to cut out of his Notebooks those pages which contained the material of which he felt most in need. The result was that the Notebooks themselves were mutilated; but it was found that, as they stood, they provided so much useful information on the way in which Darwin's thoughts flowed, and the dates on which he made certain notes, that they were published. About a year later, some of the excised pages were found, partly among papers which Sir Robin Darwin had deposited with the Science Museum and subsequently transferred temporarily to the British Museum (Natural History), and partly in the Museum's library. In this manner 28 pages were recovered, the notebooks to which they had belonged determined, transcribed, edited, and published.

On the death of Mr. Bernard Darwin, his son Sir Robin Darwin deposited temporarily at the Museum a box of papers in which were found 202 more of the missing pages, and these form the subject of the present publication. The number of pages still missing now stands at about 70, and of these some may have been blank. The probability of their being discovered is small, and it is probable that as much has been collected of Darwin's Notebooks on Transmutation of Species as ever will be: 824 pages.

These newly found pages were the ones which Darwin himself considered to be the most important for his work, and it would be impossible to comment on them. An exception must, however, be made, in drawing attention to the pages (III, 134 & 135) which make it possible to determine which passage it was in Malthus's *Essay on the Principle of Population* which provided Darwin with what he required to prove that natural selection forced favourable adaptive variants into their ecological niches, to know the exact date when this struck him, and to read the immediate effect which this had in his mind and led him to draft his most striking definition of natural selection.

The different notebooks to which the pages originally belonged were identified by the late Mr. A. C. Townsend and one of us (B.M.S.) by comparing the scissor-marks on the pages and on the stumps left in the notebooks.

Darwin classified his excised pages and marked many of them with large figures scrawled in black or red pencil. A table of these is given.

The editorial policy adopted with the excised pages is the same as that used with the Notebooks, but simplified as much as possible. No attempt has been made at facsimile reproduction, and if a reader should require to know whether any particular word or phrase was written in ink or in pencil, and possibly at a later date than the body of the text, he must consult the original manuscript pages, which are now in the Cambridge University Library.

It is a pleasure to record indebtedness to Sir Robin Darwin, Mr. H. R. Creswick, Mr. P. J. Gautrey, and particularly to Dr. Sydney Smith who not only gave us the benefit of his Transcription of difficult readings of the text and pointed out many of our mistakes, but very kindly supplied us with the text of additional excised pages which he found in the Cambridge University Library.

TABLE OF NUMBERS MARKED IN PENCIL MADE BY DARWIN ON PAGES EXCISED FROM HIS NOTEBOOKS ON TRANSMUTATION OF SPECIES.

N.B. Some pages are marked with more than one number. They are all referred to here by the Notebook in Roman figures, followed by the manuscript page number in arabic figures.

Number	
2.	III. 114, 148.
3.	II. 47, III. 12.
5.	IV. 56.
7.	II. 160, III. 102.
9.	II. 253.
10.	I, 190, II. 215, III. 54, IV. 124, 130, 170.
11.	I. 70, 126, II. 71, 107, 110, 111, 142, 161, 185, 206, 222, III. 29, 55, IV. 25, 91.
16.	III. 7, 136.
17.	I. 30, 52, 189, II. 210, III. 31, 73, 85, 87, 105, 159, 173, IV. 123, 169.
18.	I. 124, II. 23, 40, 94, 213, 227, IV. 139, 166.
19.	I. 56, 154, 160, 177, 199, 201, 209, 234, 249, 255, II. 13, 18, 25, 27, 41, 50, 92, 109, 183, 205, 216, 225, 227, 249, 251, III. 31, 45, 61, 133, 151, IV. 10, 12, 19, 21, 42, 166, 173, 176.
20.	I. 76, 107, 173, II. 93, 102, 148, 184, 238, 239, 241, 250, IV. 20, 104.
21.	II. 257, IV. 88, 120.
22.	IV. 6, 87, 126, 166
23.	II. 50, 160, III. 148, IV. 56.

Pages excised by Darwin from his First Notebook on Transmutation of Species

I

29 … not. —

Monad has not definite existence. —

There does appear some connection shortness of existence, in perfect species from many changes and base of branches being dead from which they bifurcated. — |

30 Type of Eocene with respect to Miocene of Europe?

Loudon. Journal of Nat History[1]. July 1837. Eyton of Hybrids propagating freely. |

51 the nearest species often come [from] very remote quarters. (N.B. if Plata Partridge or Orpheus was introduced into Chili in present state it might continue & thus two species be created) & live in same country. How in propagation of wolf & Dog.[1A] (because being believed same species) if they do not breed readily point in view. — ?whether highly domesticated animals like races of man. — |

52 M. Flourens.[2] Journal des Savants. April 1837. p. 243 it is said as well known fact that " serin avec le chardonneret, avec la linnotte, avec le verdier " & for silver gold & common pheasants & fowls. — " on sait que le ' métis ' du loup et du chien, que celui de la chèvre et du bélier, cessent d'être feconds dès les premières generations " go back to type of either animal when crossed with it. — |

55 There certainly appears attempt in each dominant structure to accom[m]odate itself to as many situations as possible. — Why should we have in open country a ground woodpecker. — do. parrot. — a desert Kingfisher. — mountain tringas. — upland goose. — water chionis, water rat with land structures; carrion eagles. — This is but carrying on attempt at adaptation of each element. —

May this not be explained on principle of animal having come to island where it could increase, but there were causes to induce great change. like the Buzzard which has changed into Caracara at the Galapagos. law of chance would cause this to have happened in all but less in water birds. — |

56 Fernando Noronha Ophyessa bilineata (Gray) new species belonging to true American genus.

Waterhouse[3] says he is certain, that in insects, each family, however many there may be, represent every other, for instance in Heteromera, you have representatives (which at first would be mistaken for) Carabidae, Chrysomela, Scarabeidae, & Longicornes. —

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[1] Thomas Campbell Eyton. " Some Remarks upon the Theory of Hybridity ". *Mag. Nat. Hist.*, N.S. vol. 1, 1837, p. 357: " a hybrid male and female, derived from the Chinese and common goose, had been productive *inter se* "

[1A] John Hunter, *Observations on certain parts of the Animal Oeconomy*, with notes by Richard Owen, London 1837, " Observations tending to show that the Wolf, Jackal and Dog are all of the same species ".

[2] Marie-Jean-Pierre Flourens. Review of Cuvier's *Recherches sur les ossemens fossiles*, in *Journal des Savans*, avril 1837, p. 243.

[3] George Robert Waterhouse. " Description of some new species of exotic insects ", *Trans. Entom. Soc. Lond.*, vol. 2, pp. 188–196. On p. 189:— " This collection consists chiefly of Coleopterous insects, and among them I had most of the curious *forms* observed in the section *Heteromera*, — my object being to show that the species thus selected were analogous representations of other groups of beetles; that is to say, that they departed from their own group in certain characters of form, colour, &c., and that in these respects they appear to have borrowed (if I may use such a term) the characters of other groups of the same order, to which they bear such a resemblance that they might at first sight be mistaken for species belonging to those groups ".

Again taking a subdivision of Heteromera |

69 tendency to keep to one line.[3A] Dr. Smith[4] says very close species generally frequent slightly different localities, so that they become useful to know what is species. —

70 In proof that structure is simple adaptation, armadilloes & | & Megatherium each with same kind of coat. — If we could tell, I do not doubt even colour hereditary in time and in space (Mem. Galapagos). Little wings of Apteryx. *Dacelo & Kingfisher same colours* |

75 relation of types in two countries direct relation to facilities of communication.

Have *races* of Plants ever been crossed really, if there is any difficulty in such marriages or offspring show tendency to go back — there is an end to species. — |

76 Brown[5] Appendix. A most remarkable observation of Mr Brown about peculiarities of Flora on East & West ends of New Holland. diminishing towards centre (p. 586) — Parallel 33°–35° some of forms reduce towards Northern Eastern end & die away & partake of Indian character. |

107 Ed. New. Philosoph. J. No. 3 p. 207 "It is not generally known that Ireland possesses varieties of the furze, broom, & yew very different from any found in great Britain. British varieties are also found in Ireland.[6] — |

108 There must be progressive development; for instance none ? of the vertebrata could exist without plants & insects had been created; but on other hand creations of small animals must have gone on since from parasitical nature of insects & worms. — In abstract we may say that vegetables & most of insects could live without animals |

123 Race permanent, because every trifle hereditary, without some cause of change; yet such causes are most obscure without doubt: vide cattle: The grand fact is to establish whether in crossing very opposite races whether you would expect equal fertility. ditto in Plants. |

124 It will be well to refer to Chamisso[7] Vol. III, p. 155 about quantities of seeds in sea: also Holman[8]: Keeling these are most important facts. — As soon as island large enough for land birds, seeds picked from the beach by the birds: most seeds germinating. — |

125 It would be curious experiment to know whether soaking seeds in salt water &c has any tendency to form varieties?

[3A] Andrew Smith. "Observations relating to the Origin and History of the Bushmen", *The South African Quarterly Journal.* No. 1, 1830, pp. 171–189.

[4] Andrew Smith. "A description of the birds inhabiting the South of Africa", *S. Afr. Quart. Journ.*, No. 3, 1830, pp. 225–241; on p. 237:— "when a doubt can justly exist as to identity, to consider the objects, especially if their habitats be very far apart, as distinct species".

[5] Robert Brown. Appendix No. III in *A Voyage to Terra Australis.* by Matthew Flinders, vol. 2, 1814, pp. 533–613; General Remarks, geographical and systematical, on the Botany of Terra Australis; p. 586:— "nearly half the Australian species of plants, at present known, have been collected in a parallel included between 33° and 35° latitude; and it appears from the preceding observations on the several natural orders, that a much greater proportion of the peculiarities of the Australian Flora exists in this, which I have therefore called the *principal parallel* . . . Within the tropic at least on the East coast, the departure from the Australian character is much more remarkable, and an assimilation nearer to that of India than of any other country takes place".

[6] Robert Jameson, editor of *Edinburgh New Philosophical Journal*, vol. 2, 1826, Scientific Intelligence — Botany, p. 207:— "Irish Furze, Broom, and Yew".

[7] Adelbert von Chamisso, in Otto von Kotzebue, *A Voyage of Discovery into the South Sea and Beering's Straits* . . . translated by H. E. Lloyd, London 1821.

[8] James Holman. *Voyage round the World*, London 1834.

Ed. N. Phil. J.[9] Moose found in Virginia p. 325 July 1828. Animal now confined to extreme North. — do p. 326 2 Fossil species of Ox in N. America[10]; as well as 2 recent. |

126 See Geol. Proc.[11] p. 569 1837. Account of wonderful fossils of India.

Great monkeys[12] & p. 545.

Mr. Johnston[13] says Mag of Zooly & Bot p. 65 vol II talking of annelidae. — The fact is an additional illustration of that axiom in Natural History that all aberrant & osculant groups are not only few in species, but every two or three [in] them form genera

this is from unfavourable conditions there are many gaps & those forms which nevertheless have produced species, have |

153 See R.N.[14] p. 130 speculations on range of allied species. p. 127 p. 132. There is no more wonder in extinction of individuals than of species.

Paris Tertiary Shells in India![15] ? A[16] p. 28

Dr Beck[17] & Lyell.[18] most curious law of species few in Arctic in proportion to
154 genera. agrees with late production of those regions & consequently | not many get multiplied: N.B. How does this bear with law referred to by Richardson[19] in Report about each genus having its parent type in hotter parts of world.

Is monkey peculiar to C. de Verd Is.? No. Macleay[20] passage given in Congo Expedition.

We need not expect to find varieties intermediate between every species. — Who can find trace or history of species between |

---

[9] *Edinburgh New Philosoph. Journ.* vol. 5, 1828, p. 325, " Discovery of a fossil walrus or sea-horse, in Virginia.

[10] J. E. Dekay. " On a fossil ox from the Mississipi ", *Edinburgh New Philosoph. Journ.*, vol. 5, 1828, p. 326.

[11] Sir Proby T. Cautley & Hugh Falconer. " On the remains of a fossil Monkey from the Tertiary strata of the Sewalik Hills in the north of Hindostan ", *Proc. Geol. Soc.*, vol. 2, No 51, 1837, p. 568.

[12] Sir Proby T. Cautley & Dr Royle : in an extract from a letter in *Proc. Geol. Soc. Lond.* vol. 2, No. 51, p. 545 " . . . The animal must have been much larger than any existing monkey . . ."

[13] George Johnston. " Miscellanea Zoologica. The British Ariciadea ". *Mag. Zool. Bot.* vol. 2, 18., p. 65 :— " not only comparatively few species, but at the same time these species so dissimilar among themselves that each, or every two or three of them, will be found to have characters which are properly generical ".

[14] Sir John Richardson. *Report on North American Zoology* (6th Report of the British Association for the Advancement of Science, 1836). An offprint was given by the author to Darwin and was heavily annotated by him ; now in Cambridge University Library. Information kindly supplied by Dr Sydney Smith.

[15] Sir Charles Lyell. *Principles of Geology*, 5th ed. Loudon, 1837, vol. 3, p. 378–379 :— " The Recent Strata form a common point of departure in all countries . . . Thus, for example, if strata should be discovered in India or South America, containing the same proportion of recent shells as are found in the Paris Basin, *they* also might be termed Eocene ".

[16] Reference untraced.

[17] Heinrich Henrichsen Beck. " Notes on the Geology of Denmark ", *Proc. Geol. Soc.* vol. 2, 1838, p. 217.

[18] Sir Charles Lyell. *Principles of Geology*, 5th ed., London 1837, vol. 3. See also Alexandre de Humboldt, *Dictionnaire des sciences naturelles*, Paris 1820, tome 18, p. 422 ; table : " Sur les lois que l'on observe dans la distribution des formes végétales ".

[19] Sir John Richardson, *Report on North American Zoology*, (*Rep. Brit. Assoc. Adv. Sci.* [*Bristol* 1836] vol. 5, 1837, pp. 121–224.

[20] Reference uncertain. Capt. Tuckey's *Narrative of an expedition* [*to explore*] *The River Zaire usually called the Congo, in South Africa in 1816.* John Murray 1818. p. 36. " The only species here is the green monkey (Cercopithecus sabaeus)."

159 Von Buch[21] says from Humboldt[22] in Laponia genera to species 1.2, 3 — From Mackenzie[23] Iceland then 144 genera & 365 species of plants not cryptogamic 1·2, 53.—

In known varieties there is analogy to species & genera. — for instance three kinds of greyhound. — In plants do. the seeds of marked varieties produce no difference. if they do. — there probably will be this relation also. Yes. Fox.[24] |

160 The creative power seems to be checked when islands are near continent: compare Sicily & Galapagos!! —

Some of the animals peculiar to Mauritius are not found at Bourbon Zoolog. Proceedings[25] A.D. 1832 p. 111 |

173 Roxburgh[27] list of plants in Beatsons[28] St Helena — Galapagos — Juan Fernandez — Falkland Islds — Kerguelen land. — Phillips.[29] Lardner Encyclop. insists on analogy between Australia and fossils of Oolitic series. does not appear to me very strong. what is Osteopora platycephalus. (Harlan) found on Delaware is it Edentate? Phillips[30] Lardner p. 289 |

174 It is certain that North American fossils bear the closest relation to those now living in the sea. — See Rogers[31] report to Brit. Assoc. on *N. American Zoology* — |

177 and milk — Fox[32] tells me that it is generally said. = = How came first species to go on. There *never* were any constant species. Both males & females lose desire.

Native dog not found in V. Diemen's land J. de Physique Tom 59 p. 467 Peron.[33] |

178 G. St Hilaire[34] has written "Opuscule entitled Paleontographie" developing his ideas on passage of forms. — Deshayes[35] states Lamarck[36] priority refers to introduction to Animaux sans Vertebres as latest authority — The case of the tail[l]ess cat of the Isle of Man mentioned in Loudon[37] analogue of Bloodhound. — |

[21] Leopold von Buch. *Description physique des Iles Canaries*, traduit de l'allemand par C. Bourgeois, Paris 1830. Proportion of genera to species: in North Africa 1 to 4·2; in Canary Islands 1 to 1.46; on St Helena 1 to 1·5. According to Humboldt, in France 1 to 5·7; in Lappland 1 to 2·3.

[22] Alexander von Humboldt. *De distributione geographica plantarum secundum coeli temperiem et altitudinem montium, prolegomena*, Lutetiae Parisiorum 1817.

[23] Sir George Stewart Mackenzie. *Travels in the Island of Iceland*, Edinburgh 1812, Chapter VIII, Botany, pp. 350–356.

[24] William Darwin Fox. Probably personal communication.

[25] Julien Desjardin. *Proc. Zool. Soc.* 1832, p. 111:— "their animals are not universally the same, some species being met with in the one which never occur in the other".

[27] William Roxburgh. List of Plants relative to the Island of St Helena, in Alexander Beatson, *vide infra.*, following footnote.

[28] Alexander Beatson. *Tracts relative to the Island of St Helena*, [London], 1816.

[29] John Philips. Treatise on Geology, in *Lardner's Cabinet Cyclopedia*, London 1837.

[30] *ibid.*

[31] Henry Darwin Rogers. "Report on the Geology of North America", *Rep. Brit. Assoc. Adv. Sci.* Edinburgh 1834 [1835], vol. 3, pp. 1–66.

[32] William Darwin Fox. Probably personal communication.

[33] François Péron, "Sur quelques faits zoologiques applicables à la théorie du globe, lu à la Classe des Sciences physiques et mathématiques de l'Institut National". *Journ. de Physique, de Chimie, d'Histoire naturelle et des Arts*, tome 59, 1804, p. 463; Première section: observations zoologiques qui peuvent faire douter de la réunion primitive de la Nouvelle-Hollande à la Terre de Diemen. On p. 466:— "Le chien . . . n'existe pas sur la Terre de Diemen".

[34] Etienne Geoffroy-Saint-Hilaire. See following footnote. The basic idea is contained in his *Principes de philosophie zoologique*, Paris 1830, p. 214.

[35] Gérard-Paul Deshayes. Bull. Soc. géol. France, tome 4, 1833–4. p. 99:— "M. Deshayes répondant à ce que M. Geoffroy-Saint-Hilaire a exposé dans la séance précédente en présentant son opuscule intitulé: *Paléontographie*, réclame en faveur de notre célèbre Lamarck la priorité de cette idée, que les animaux sont modifiés dans leur organisation par les circonstances ambiantes".

[36] Jean-Baptiste de Lamarck. *Philosophie zoologique*, Paris 1809; also *Histoire naturelle des animaux sans* vertèbres, Paris 1815–1822.

[37] Edward Blyth. "An attempt to classify the 'Varieties' of animals, with observations", *Loudon's Mag. Nat. Hist.* vol. 8, 1835, p. 40. On p. 47:— tailless cats . . . are other striking examples of *true varieties*".

189 on hybrids between grouse & Pheasant.[38] Magazine Zoolog. & Botany vol. 1, p. 450.

There is in nature a real repulsion amounting to impossibility holds good in plants between all different forms ; therefore when from being put on island & fresh species made parents do not cross — we see it even in men ; thus possibility of Caffers & Hottentots coexisting proves this. — but when man makes variety then are vitiated. — this barely applies to plants |

190 Female pig apt to produce monsters in Isle of France.[39] — Madagascar oxen with hump.[40] — p. 173 Voyage par un Officier du Roi

Mem. Capt. Owen's[41] story of cats on West coast of Africa. — changing hair. The Edinburgh Journal of Natural History.[42] Preface appeared good with facts about changes when animals transported. |

199 Bustards in Germany. —

Athenaeum[43] No. 537 Feb. 1838 p. 107. Mr. Blyth states that all genera of birds in N. America & Europe, which have not their representative species in each other, are migratory species from warmer countries. When will this paper be published it will be curious. — Some general statement about mundine & confined genera. — |

200 Lyell[44] has remarked about no confined species in Sicily.

Jan. 1838 l'Institut.[45] Bats. in Eocene beds very like present species. p. 8? are mundine forms longest persistent ?? do. — The most perfect Plants Composit.[46] — !! *good those which have undergone most metamorphosis* is this applicable to insects &c. &c. ? — p. 23 do. — On animal—Confervae.[47] p. 23 |

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[38] William Thompson. " On hybrids produced in a Wild state between the Black-Grouse (Tetrao tetrix) and Common Pheasant (Phasianus colchicus) ", Mag. Zool. Bot., vol. 1, 1836–1837, p. 450.

[39] Jacques-Henri Bernardin de Saint-Pierre. *Voyage à l'Isle de France, à l'Isle de Bourbon, au Cap de Bonne-Espérance, &c., Avec des Observations nouvelles sur la mature & sur les Hommes, par un Officier du Roi*, Amsterdam 1773, tome 1, p. 247 :— " . . celle du cochon . . . La femelle de cet animal est sujette dans cette Isle à produire des monstres ".

[40] Bernardin de Saint-Pierre, op. cit., tome 1, p. 246 :— " des boeufs dont la race vient de Madagascar. Ils portent une grosse loupe sur leur cou ".

[41] William Fitzwilliam W. Owen. *Narrative of a Voyage to explore the shores of Africa, Arabia, and Madagascar* . . . London 1833.

[42] *Edinb. Journ. Nat. Hist.* No 2, 1835, p. 5 :— " We are astonished when we study their geological relation in any particular district or country ; their geographical distribution, relatively to the world itself, or their migration from one country to another ; their connection with climate, there being domestic plants, which follow man in his improvement and change of soil, or wanderers seeking to inhabit distant regions, formerly uninhabited by their kinds, or by their being social and living, like man, in large communities ; their abundance or rarity ; their mode of propagation ; their natural enemies, or more kindly friends."

[43] Edward Blyth. *Athenaeum*, No. 537, February 1838, p. 107 :— " . . . that those North American birds which have no generic representative in Europe, and those European genera which have no species proper to America are, almost without exception, migratory, belonging to types of forms characteristic of those regions where they pass the winter ".

[44] Sir Charles Lyell. *Principles of Geology*, 5th ed. London 1837, vol. 3, p. 444 :— " The newly emerged surface, therefore, must, during the modern zoological epoch, have been inhabited for the first time by the terrestrial plants and animals which now abound in Sicily . . . The plants of the flora of Sicily are common, almost without exception, to Italy or Africa, or some of the countries surrounding the Mediterranean ; so that we must suppose the greater part of them to have migrated from pre-existing lands ".

[45] Henri-Marie de Blainville. *L'Institut*, 1838, p. 6, Zoologie, Chauve-Souris. On p. 8 :— " ces familles existaient avant la formation des terrains tertiaires . . . si anciennes ne différaient que fort peu, si même elles différaient des espèces actuellement vivantes dans les mêmes contrées ".

[46] J. Meyen. *L'Institut*, tome 6, 1838, Physiologie végétale ; on p. 23 :— " M. Fries décide que les Composées sont les plantes les plus complètement développées ".

[47] *ibid.* " M. Mohl a fait connaître d'abord ses observations sur le Conferva ".

201 p. 267 Dela Bêche[48] Geolog. Researches. facts of salt-water shells living in absolutely fresh water. Origin of fresh-water genera ? The absence of lime in Plutonic & Volcanic rocks most remarkable. — ? Have the changes been so slow, that all have existed for ages as metamorphic & therefore according to Lyell's[49] doctrine removed ?? |

202 Is the prevalence of Coniferous Woods before Dicotyledenous a fact analogous to reptiles before mammalia

Think about Miocene fossils some species being recent agreeing with Senegal. whilst Crag according to Beck[50] has none recent yet genera same. — Speculate on multiplication of species by travelling of Climates & the backward & forward introduction of species. — |

209 Bolivian human species[51]? —

Small new animal mentioned from Fernando Po.[52] Zoolog. Proceedings October (?) 1837 [Contrast New Zealand with Tasmania].[52A] The reason why there is not perfect *gradation* of change in species as physical changes are *gradual* ; is this if after isolation (seed blown into desert or separation of mountain chains &c.) the species have not been *much* altered they will cross (perhaps more fertility & so make that sudden step. species or not. |

210 A plant submits to more individual change, (as some animals do more than others & cut off limbs & new ones are formed) but yet propagates varieties according to same law with animals ??

Why are species not formed during ascent of mountain or approach of desert? — because the crossing of species less altered prevents the complete adaptation which would ensue |

233 *Dr Smith's information.*[53] Long Horned (very) aboriginal at Cape crossed with English Bull. offspring very like common English. — Hottentots say great tailed sheep aboriginal at Cape & a thinner tailed kind farther inland. —

N.B. There is division of snakes with hinder teeth perforated for poison channels, but not having them. instance of useless structure.

Smith[54] thinks several species of Rhinoceros range from Abyssinia to extreme South coast. Elephant he believes is mentioned by old writers on extreme Northern
234 coast. | Hippopotamus do. — Giraffe do. —

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[48] Sir Henry Thomas de La Bêche. *Researches in Theoretical Geology*, London 1834, p. 267 :— " *Voluta magnifica* is known to live high up in the brackish waters near Port Jackson in Australia, and an *Arca* inhabits the freshwater of Jumna, near Hamirpur, 1000 miles from the sea ".

[49] Sir Charles Lyell. *Principles of Geology*, 5th ed. London 1837, vol. 3, p. 302 :— " The constant transfer, therefore, of carbonate of lime from the inferior parts of the earth's crust to its surface, must cause at all periods and throughout an indefinite succession of geological epochs, a preponderance of calcareous matter in the newer, as contrasted with the older formations ".

[50] Heinrich Henrichsen Beck. " Notes on the Geology of Denmark ", *Proc. Geol. Soc.*, vol. 2,1835–1836, pp. 217–220.

[51] Joseph Barclay Pentland. " On the Ancient inhabitants of the Andes ", *Rep. Brit. Assoc. Adv. Sci*, 1834, p. 624 :— " The remains of this race are found in ancient tombs among the mountains of Peru and Bolivia ".

[52] *Proc. Zool. Soc.*, vol. 5, 1837, p. 101 :— " Mr Martin exhibited a new Bat from Fernando Po ". (Probably William Martin).

[52A] A pencil interpolation.

[53] Andrew Smith. Personal communication.

[54] Andrew Smith. *Illustrations of the Zoology of South Africa.* 1. Mammalia, London 1838, gives the range of the rhinoceros.

Range of East Indian Rhinoceros (?) — Some paper in Institut[55] on range of Bos in India. — Range of Zebra ? —

The crocodile & Tortoise former inhabits of Mauritius Freycinets[56] Voyage. agrees with *several mammalia* being peculiar (?)

If Henslow[57] discusses possibility of seeds of Keeling standing transport. — Get him to discuss those mentioned by Lesson[58] & Chamisso.[59] — |

249 Mr. Waterhouse[60] has most curious facts about the distribution of Lemurs in Madagascar, on neighbouring islets & a sub-genus in Southern Africa. In same manner, Cuscus, (a *sub* genus of Phalangista New Holland form) is found in many islands Celebes, Waygiou &c. &c. (See Lyell[61] Vol. III p. 30) different species in different isld. (as far East as New Ireland. See Coquille Voyage[62]). Waterhouse[63] remarks Australian Fauna so far. Indian all the rest. Timor according to mountain chain ought to be Australian ? — Mr. Gould[64] has been struck with similar extension of forms in Birds. — |

250 Waterhouse[65] thinks two main divisions of cats. Tortoise shell & grey — banded. ?species? thinks offspring of cats sometimes heterogenous. — Australian dog jumped into tub leaving only nose above it — pulled bell.[66] — It is most curious to observe, that all the species of mice in S. America which were hard to distinguish came from closely neighbouring localities. — Institut[67] 1838 p. 38 account of fossils of Sewalick India *Monkeys of old World* Crocodiles Anoplotherium. — |

255 T. Carlyle[68] saw with his own eyes new gate opening towards pigs. — latch on other side. — Pigs put legs over, & then with snout lift up latch & back. —

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[55] reference untraced.

[56] Louis de Freycinet. *Voyage autour du monde* . . . Paris 1825–1839. Freycinet also edited the 2nd edition of François Péron's *Voyage de découvertes aux Terres Australes*, Paris 1824, referred to above by Darwin in connexion with Mauritius.

[57] John Stevens Henslow. "Florula Keelingensis. An Account of the native plants of the Keeling Islands"., *Ann. Nat. Hist.* vol. 1, 1838, p. 337 :— "Mr Darwin . . . presented me with the plants which he collected, together with his memoranda respecting them, I have thought that a list of the species, accompanied by a few remarks, might be of interest ; and chiefly as serving to point out a set of plants whose seeds must be provided in a very eminent degree with the means of resisting the influence of sea water". It is interesting to note this early date at which Darwin was interested in the viability of seeds immersed in sea water, on which he made experiments twenty years later.

[58] René Primevère Lesson. In Louis Isidore Duperrey, *Voyage autour du Monde* . . . Paris 1826–1830, Zoologie is by Lesson and P. Garnot, tome 1, 1826.

[59] Adelbert von Chamisso. In Otto von Kotzebue, *A Voyage of Discovery into the South Sea and Beering's Straits*, London 1821.

[60] George Robert Waterhouse. Probably personal communication.

[61] Sir Charles Lyell. *Principles of Geology*, 5th ed. London 1837, vol. 3, p. 30 :— "Phalangista vulpina inhabits both Sumatra and New Holland, the P. ursina is found in the island of Celebes ; P. chrysorrhos in the Moluccas ; P. maculata, and P. cavifrons, in Banda and Amboyna".

[62] Louis Isidore Duperrey, *Voyage autour du Monde*, . . . Zoologie par MM. Lesson et Garnot, tome 1, Paris 1826, p. 158 :— "Couscous blanc, *Cuscus albus* . . . Kapoune des Nègres du Part-Praslin, à la Nouvelle-Irlande".

[63] George Robert Waterhouse. Probably personal communication.

[64] John Gould. *A Synopsis of the Birds of Australia and adjacent Islands*, London 1837–1838.

[65] George Robert Waterhouse. Probably personal communication.

[66] Reference untraced.

[67] Hugh Falconer & Sir Proby T. Cautley. "Sur de nouvelles espèces fossiles de l'Ordre de Quadrumanes", *L'Institut* tome 6, 1838, p. 37. Also *Proc. Geol. Soc.* vol. 2, 1837, p. 544 :— "extract of a letter, dated Saharumpore 18th November 1836 . . . Captain Cautley and Dr Royle . . . of the finding of the remains of a quadrumanous animal in the Sewaliks, or Sub-Himalayan range of mountains. An Astragalus was first found, but latterly a nearly perfect head, with one side of the molars and one orbit nearly complete. The animal must have been much larger than any existing monkey, and allied to Cuvier's Cynocephaline group".

Frogs attempted to be introduced to isle of France.[69] p. 170 Fish introduced, Hump backed race of cows from Madagascar.[70] — p. 173 Vol. I. Voyage de France par un Officier du Roi. —
Mackenzie[71] Travel. p. 280 says cattle in Iceland are very like the largest of our highland sort, except in one respect, that those of Iceland are seldom seen with horns.
256 p. 341 Black Fox sometimes introduced by ice[72] | very few pigs. — birds mentioned but few. — There was notice in Report of British Association of 1838 (Newcastle) about somebody who had made great collection of birds of Iceland.[73] — Mr. Gaimard,[74] however, will settle this. —

Waterhouse[75] says he is certain there are local varieties of colour & size but not forms (?) of animals. — He says Stephen[76] says he can at once tell by general colouring a group of Nebria complanata from Devonshire from another from Swansea. — Again Waterhouse[77] finds certain varieties of Harpalus common at Southend, but absent from near London. — Dr Smith,[78] he says, is deeply |

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[68] Thomas Carlyle.

[69] Bernardin de Saint-Pierre. *Voyage à l'Isle de France* . . . Amsterdam 1773, tome 1, p. 170, fish and frogs introduced to Isle de France (= Mauritius).

[70] *ibid.* p. 246.

[71] Sir George Stewart Mackenzie. *Travels in the Island of Iceland* Edinburgh 1811, p. 280 :— " The cattle, in point of size and appearance, are very like our highland sort, except in one respect, that those of Iceland are seldom seen with horns ".

[72] ibid., p. 341 :— " Two distinct varieties of fox present themselves in Iceland : the arctic, or white fox (Canis lagopus), and one which is termed the blue fox (Canis fuliginosus) and varies considerably in the shades of its fur, from a light brownish or blueish grey . . . Horrebow mentions the black fox is sometimes brought over on the ice ".

[73] John Hancock. " Remarks on the Greenland and Iceland Falcons " (Collectors : G. C. Atkinson & P. Procter), *Rep. Brit. Assoc. Adv. Sci.* vol. 7, 1839, p. 106.

[74] Paul Joseph Gaimard. Reference to work which ultimately appeared as " Liste des oiseaux qui se rencontrent en Islande avec des remarques sur leur présence dans cette île par M. Raoul Angles " in *Voyage en Islande et au Groenland* . . . Paris 1851. The voyage took place in 1834.

[75] George Robert Waterhouse. Probably personal communication.

[76] James Francis Stephens. *Zoological Journal*, vol. 1, 1825, p. 448, Art. 57, " Some observations on the British Tipulidae, together with descriptions of the Species of *Culex* and *Anopheles* found in Britain ". A footnote on p. 451 refers to a collection of *Nebria* made in Devonshire by Dr William Elford Leach.

[77] George Robert Waterhouse. Probably personal communication.

[78] Andrew Smith.

Pages excised from Darwin's Second Notebook

II

13 Falkner[1] Patagonia no description of wild animals, nor in Dobritzhoffer[2] Abipones. —

Voyage de l'Astrolabe Zoologie[3] p. 60 Vol. I Cynocephalus niger comes from the Moluccas Matchian & Celebes. Amboina, Viverra Zibetha.[4] All the Moluccas, Waggiou, New Guinea, New Ireland, have phalangista[5] which differ in form & head & colour from those of New Holland. — The New Holland species are not found in the Archipelago. — Former statements to such effects false. In New Guinea a Kangaroo D'Aroe (Didelphus Bruni)[6] which as yet had only been found in isle of Aroe & Solor. |

14 likewise Vol. I new species of Parameles,[7] which joined to Casoars, perroquets, establishes its Zoolog alliance with New Holland. The Barbaroussas[8] (when young very like the Siam race with Long nozzle & few hairs) inhabits Celebes & few of the larger islands. — Antelope in Celebes. Bourou[9] new species of Aries Cervus moluccensis different from that of the Mariana islands & at Amboina. — I fancy there is marked wild breed of oxen at Java. p. 140 calls it Bos leucoprymnus.[10] does not say whether wild or not. p. 156 Parroket with stiff tail like woodpecker.[11] — |

17 The changes in species must be very slow owing to physical changes slow & offspring not picked. — as man do when making varieties. —

Voyage of Coquille.[12] Zoolog. p. 19 Tapir de Courrucous et rupicole vert instances of American forms in East. Ind. Archipelago. — Raffles,[13] Horsfield,[14] Diard,[15] Duvaucel,[16] Leschenault,[17], Kuhl,[18] Van-Hasselt,[19] Reinwardt,[20], Forrest[21] authors on E. Indian Arch.

Borneo & Sumatra both seem to have elephant & has orangs.[22] Tapir common to Sumatra & Molucca. Borneo & Molucca & Cochin China are said to have orangotang & Pongo in common.[23] Galiopithecus common to Moluccas & Pelew Is^{ds}. p. 22 New Caledonia New Ireland p. 123 & Britain same kind of dog with those of New S. Wales. |

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[1] Thomas Falkner. *A Description of Patagonia and the adjoining parts of South America*, Hereford, 1774.

[2] Martinus Dobritzhofer, *Account of the Abipones*, London, 1822.

[3] Jean René Quoy et Joseph Paul Gaimard, *Voyage de découvertes de l'Astrolabe, Zoologie*, Paris, 1830, tome 1, p. 60.

[4] *ibid.*, p. 61.

[5] *ibid.*, p. 62.

[6] *ibid.*, p. 62.

[7] *ibid.*, p. 62 : " petit kanguroo à queue courte ".

[8] *ibid.*, p. 63 : " on les confond avec les petits cochons . . . de Siam ".

[9] *ibid.*, p. 64 : " à Java un boeuf remarquable par sa grande taille ".

[10] *ibid.*, p. 140.

[11] *ibid.*, p. 156 : " queue à plumes fortes et usée comme celles des Pics ".

[12] René Primevère Lesson et Prosper Garnot, *Voyage autour du Monde . . . sur . . . La Coquille. Zoologie*, Paris, 1826, p. 19.

[13] Sir Thomas Stamford Raffles, *History of Java*, London, 1817.

[14] Thomas Horsfield, *Zoological Researches in Java and the neighbouring islands*, London, 1824.

[15] Diard is mentioned in the *Dictionnaire Larousse*, under " Duvaucel " as a French naturalist whom the latter met on his expedition, in 1818.

[16] Alfred Duvaucel (1792–1824).

[17] Jean Leschenault de la Tour (1773–1826).

[18] Heinrich Kuhl, in K. H. Blume, *Enumeratio plantarum Javae et insularum adjacentium*, Lugd. Batav. 1827–8.

[19] van Hasselt, collaborator with Heinrich Kuhl.

[20] Caspar Georg Carl Reinwardt.

[21] Thomas Forrest, *A Voyage to New Guinea and the Mollucas . . .*, London, 1779.

[22] Lesson et Garnot, *op. cit.*, p. 20 : " Sumatra et Bornéo paraissent renfermer quelques espèces de quadrupèdes identiques, tels que l'éléphant des Indes, *Elephas indicus* Cuv. et les orangs ".

18 Crocodile at New Guinea. All the isles of Oceania have the Scincus with golden streaks. — the lacerta vitteli extends to from Amboina to New Ireland. p. 23 (Voyage of Coquille Lesson)
no (p. 24) batrachian in isles of great Ocean says in conformity with Bory's[23A] Views.

D'Orbigny[23B] is said to have brought a tortoise & toad from S. America & identical with those from S. Africa. M. Brissou[23C] doubts fact. — My toad is same species. |

23 p. 158 Cuscus albus.[23D] New Ireland. maculatus Waigiou.
Speaking of Lepus Magellanicus says, " après un examin attentif, et forts surtout de l'opinion du baron Cuvier, nous ne balançons pas à le regarder comme une espèce distincte ".[23E] p. 171 Sus papuensis partly domesticated like in general appearance the Siamese kind. — but considered good species from dental characters, wild pig said by Forrest to swim from one is^{ld} to another.[24] — It is a good species. with different numbers of teats.[24A] (Coquille Voyage) |

24 Durville[25] has written Flora of Falkland Isl^{ds}. where is it? All the Society isles have the same productions[25A] p. 293. is very strong about this Lesson insists much. — The (p. 296) Columba Kurukuru found in all Malaisia & oceania, offers many varieties in each place to puzzle naturalists. — p. 372 Bourous the Babyroussa; a Cervus near Marianus new; & some rats & mice. In Amboina only Cuscus & Babiroussa |

25 N.B. (Isl^{ds} springing up more likely to have different species than those sinking. because arrival of any one plant might make condition in any one isl^{d} different). — p. 414. dogs of New Zealand of large size, resemble chien-loup. — cross, black & white, ears short & straight — do not bark.
p. 433 birds & bats have certainly travelled from East Indies Isl^{d} as far as Oualan. — wide space of sea. The East of America would account for this. — (Coquille Voyage) Says no reptiles p. 460 & very doubtful whether any birds Except Dodo !! — in Mauritius|

26 Lesson & p. 620 Centropus (coucal) of Java & Philippines has variety at Madagascar, Calcutta & Sumatra, but I do not see how it is known that they are varieties & not species. — Vol. 1. 694. Kingfisher of Europe (Alcedo ispida) from Moluccas

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[23] *ibid.*, " Bornéo récèle sans doute beaucoup d'animaux inconnus ; mais ceux qu'on y indique plus particulièrement, tels que l'orang-outan et le pongo, existent aussi, à ce qu'on assure, et dans la cochinchine et sur la presqu'île de malacca ". *Pongo* is the name of the orang-utan, but it is found only in Borneo and Sumatra.

[23A] Jean-Baptiste Bory de St Vincent, *Voyage dans les quatre principales îles des Mers d'Afrique*, Paris, 1804.

[23B] Alcide Dessalines D'Orbigny.

[23C] Mathurin Jacques Brisson, author of *Regnum animale*, Parisiis, 1756.

[23D] Lesson et Garnot, *op. cit.*

[23E] *ibid.*, p. 169.

[24] Thomas Forrest, *op. cit.*, p. 97.

[24A] Lesson et Garnot, *op. cit.*, p. 175.

[25] Jules-Sébastien-César Dumont d'Urville, " Flore des îles Malouines ", *Mémoires de la Société Linnéenne de Paris*, tome 4, 1825.

[25A] Lesson et Garnot, *op. cit.*

scarcely differs at all from those of Europe, but beak rather sharper & rather longer
in proportion, colour slightly different. Who can say whether species or varieties.
27 p. 708. Columba Oceanica (Less.) inhabits Caroline | isld (perhaps Philippines &
perhaps Friendly Isles & Hebrids) is very closely allied to C. muscadivora, which
lives in the Eastern Moluccas. New Guinea. — (Case of replacement). Coquille
Voyage. The Casuary inhabits Ceram, Borneo & especially New Guinea (replaces
Emeu) in North of New Holland. —

New Guinea scarcely differs more from Australia more than Van Diemen's land —

Vol. II p. 8 no snakes on isles of central Pacific. yet there appears to be one at
Botouma from account of natives, & probably on Oualan. Mitchell[26] says snakes
on Friendly isles. p. 50 LX Journal of Silliman. Study Silliman |

28 Vol. II p. 10 it seems that crocodile was washed on shore at one of the Pellew
isl^{ds} — killed a woman.[27] Chamisso[28] p. 189 Tome III Kotzebue. — p. 22 a Gecko
on St. Helena.[28A] — one Gecko on Isle of France Scincus multilineatus (p. 45)
Moluccas & New S. Wales. Scincus cyanurus p. 8 & p. 49 on all the Moluccas New
Guinea & New Ireland & even Java & very common on Otaheite according to Quoy
& Gaimard[28B] stated in note to p. 21 in Sandwich isl^{d}. & according to Chamisso on
Radack isl^{d}. —

p. 69 Shark very generally distributed : Mem. of great geological age. Gastrobranchus only two species, one in Northern Hemisphere 2nd in southern. p. 71
Chimera antarctica caught Chile, Van Diemen's land & Cape of Good Hope. p. 44
of this Note Book.[28C] also the Taeniatole austral |

39 ? Europe has many species but not genera distinct from rest of world ???
Lyells Principles must be abstracted & answered.
Much might be argued what is *not* cause of destruction of large quadrupeds. —
common to these types of animals.
What reptiles coexisted with Palaeotherium in Paris quarries & at Binstead. Mem.
recent crocodile with Palaeotherium in India — : connection with Latitudes ! ? |

40 Zoological Journal. — Vol. I p. 81 Capromys.[29] West Indian isl^{d}. p. 120 ref.
Philosoph. Transacts 1823 (Read June 5) important paper by Dillwyn,[30] on replacement of Cephalopoda & Trachilidous Molluscs by each other in secondary & Tertiary
periods. — p. 125 ref. to Phil. Transacts. (read November 20th) Paper by Jenner[31]
on birds seen far at sea, migrations of species. greese [geese] killed in Newfoundland
with crops full of maize. (get limits of latter from Barton. — swifts return after

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[26] *American Journal of Science and Arts*, vol. 10, no. 1, 1825, Zoology, Art. VI, letter from Dr. Samuel L. Mitchell, of New York, to Dr. Godman of Philadelphia, p. 50 : " circumstantial description of a two-headed serpent I received from one of the Fejee islands ".

[27] Lesson et Garnot, *op. cit.*, tome 2, p. 10.

[28] Adelbert von Chamisso, in Otto von Kotzebue, *Voyage into the South Sea*, London 1821. From the volume and page numbers that he cited, Darwin appears to have used a French edition of this work.

[28A] Lesson et Garnot, *op. cit.*, tome 2, p. 22.

[28B] *ibid.*, tome 2, p. 21, where Quoy and Gaimard, and Chamisso, are quoted.

[28C] This page is still missing.

[29] Anselm Gaëtan Desmarets, " Abstract of a Memoir on a new genus of the order Rodentia, named Capromys ", originally published in *Mémoires de la Société d'Histoire Naturelle*, Paris, tome 1, 1823.

[30] L. W. Dillwyn, " On fossil shells ", originally published in *Phil. Trans. Roy. Soc.*, London vol. 113, 1823, p. 393.

[31] Edward Jenner, " Some observations on the migration of birds ", originally published in *Phil. Trans. Roy. Soc.*, London, vol. 114, 1824, p. 11.

years to nests. Vol. II p. 49 on the localities of certain parrots habitations India & Africa.[32] — N.B. Any monograph like Gould[32A] on Trogons worth studying. — |

41 Zoolog. Journal Vol. 2. p. 221 Horsfield[33] on two bears *very* close species inhabiting Borneo & Sumatra, differ only in form of white mark on breast : p. 234. — good case

p. 526 (ref.) to Temminck[34] Monograph Mammal 4^to^, good facts about distribution of cats.

Vol. III p. 233, states that the " Asseel Gayal (Bos Gayaeus) does not mix with the Gobbich or village Ga[y]al.[35] — ? is latter same species domesticated, strangely contradictory to Azaras fact of conduct of wild & tame horses. —

p. 246 — Gymnura new genus of Mam. found in Sumatra.[36]

p. 452 Append. to Denham Clapperton &c. on Mammalia[37] no doubt will all be included in Smiths Work[37A] |

42 do. Vol. IV p. 273 Macleay[38] on Capromys. 4 species probably in Cuba (p. 271 Viedo[38A] says American dogs silent. Mem. contrary assertion of Molina) (p. 277) probably another in Jamaica & perhaps one extant at Leeward Isles.

p. 388 Reference to Rüppels Travels [39] (what language?)

Hyaena venatica of Cape found in Desert of Korti & Steppes of Kordofan. p. 401. Admirable letter from Macleay to Bicheno much excellent detail & firm views about species.[39A] — MUST BE STUDIED : genera founded in nature |

47 Zoolog. Transact. Vol. I, p. 165. — " an account of the MANELESS lion of Guzerat by Capt. W. Smee.[39B] considered merely variety. — yet form of skull very slightly different. —

Zoolog. T. V. I. p. 389 Owen[40] remarks on Entozoa. the organs of generation, afford the least certain indications of the perfection of species — ! How does this agree with grand fact of Marsupial low cerebral structure ?? — |

48 do. p. 390. All classes of *Acrita* exhibit lowest stages of animal organization, ["] & are analogous to the earliest conditions of the higher classes during which the changes of the ovum or embryo succeeded each other with the greatest rapidity "[40A] — so

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[32] N. A. Vigors, " Sketches in ornithology : or observations on the leading affinities of some of the more exclusive groups of birds ".

[32A] John Gould, *Monograph of the Trogonidae*, London, 1835–8.

[33] Thomas Horsfield, " Description of the Helarctos euryspilus ; exhibiting the Bear from the Island of Borneo, the type of a sub-genus of Ursus ", *Zoological Journal*, vol. 2, p. 221.

[34] Coenraad Jacob Temminck, *Monographies de mammalogie, ou descriptions de quelques genres de mammifères dont les espèces ont été observées dans les differens musées de l'Europe*, Paris & Leiden, 1827.

[35] *Zoological Journal*, vol. 3, p. 233, Thomas Hardwick, " On the Bos gour of India ".

[36] Thomas Horsfield, " Notice of a new genus of Mammalia, found in Sumatra by Sir Thomas Raffles", *Zoological Journal*, vol. 3, p. 246.

[37] Major N. Denham, Captain Clapperton & the late Dr Oudney. *Narrative of Travels and Discoveries. in Northern and Central Africa in the years 1822, 1823 and 1824*, London, 1826. Appendix XXI " Zoology " by J. G. Children.

[37A] Andrew Smith, *Illustrations of the Zoology of South Africa*, London, 1838–49.

[38] William Sharp MacLeay, " Notes on the genus Capromys of Desmarest . . .", *Zoological Journal*, vol. 4, p. 273.

[38A] Viedo referred to by MacLeay, *op. cit.*

[39] Wilhelm Peter Eduard Simon Rüppell, *Atlas zu der Reise in nordlichen Africa*, . . ., . . . *ibid.*, p. 388.

[39A] " A Letter to J. E. Bicheno Esq. F.R.S., in examination of his Paper ' On Systems and Methods ', in the Linnean Transactions. By W. S. MacLeay Esq ", *ibid.*, p. 401.

[39B] Walter Smee.

[40] Richard Owen, " Remarks on the Entozoa, and on the structural difference existing among them : including suppositions for their distribution into other Classes ", *Trans. Zool. Soc.* vol. 1, 1835, p. 387 ; on p. 389 : " With respect to generation, the organs of which function afford in their varieties the least certain indications of the relative perfection of the species ".

we find species each class successively present modifications typical of succeeding classes & likewise those much higher in scale. So Owen actually believes in this view !!!!

49 p. 392. — except generation & digestion in Acrite Kingdom | all organs blended together & same organ when eliminated is often repeated. as mouths in Polypi. surely not correct view of Flustra or Ascidia. spicule in sponge. stomachs in infusoria, generation in each joint of Taenia worm.[40B] — formative energies easily expended & no one system developed—not surprising to find many forms in Acrita. — typical of other (surely rather parents). (N.B. These views must lead to spontaneous generation ??) This whole paper must be studied. — |

50 D'Orbigny.[41] Birds of prey are distributed in S. America like other forms, but those inhabiting 3^d zone of height & 3^d of latitude more commonly are the same species. instead of analogues. — in other classes this evidently relates to greater range of such forms. —

p. 56[42] Ornithological Part of Voyage of ???[43] A Urubu (with one leg) attended the distribution of food at the Mission of Mojos (over 20 leagues apart from each other. — this bird was ∴ well-known for its impudence. This excellent case of memory without association. |

71 Mr. Gould[44] says wherever any mark like red patch on wing of Furnarius, Synallaxis &c. sure to unite the birds into group. — it is same as Yarrell's[45] remark about rock Pidgeons. — & the latter most important in obviating a great apparent difficulty — preservation of colouring, when form has changed. — Can be said that animals no notion of beauty. When does prefer most powerful buck|

72 Owen[46] talking of Plesiosaurus alludes to some structure in head which he says (evidently as an *exception*) can only be explained by direct adaptation to animals wants & not as change in typical structure ?!!

Whewell,[47] in comment few will dispute, says civilisation hereditary. i.e. instincts of wisdom like senses of savages virtue? (How come its [comes it] some convictions patriotic?) — but more especially the power of reasoning &c. &c. — |

91 Musalmans of the Peninsula, are, generally speaking a much fairer race than the Hindus in the same tracts & that in their appearance & manners they are as opposite as day & night : yet we know how remote the periods at which both left the land of their forefathers. — the first to escape the doctrine of Muhammad, the last to

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[40A] Richard Owen, *ibid.*, p. 390 ; it is indeed remarkable to find Owen supporting the theory of parallelism in embryology and the scale of beings.

[40B] Richard Owen, *ibid.*, p. 392.

[41] Alcide D'Orbigny, " Observations on the Raptores of South America, Translated from ' Voyage dans l'Amérique Méridionale '," *Magazine of Zoology and Botany*, vol. 1, 1836–7, pp. 347–359. Darwin's reference is to p. 352.

[42] This page reference should read 36.

[43] *Voyage dans l'Amérique Méridionale*, . . ., ... ; p. 36 : " La familiarité des urubus est extrême. Nous en avons vus, dans la province de Mojos, lors de distributions de viande faites aux Indiens, leur en enlever des morceaux, au moment même où ils venaient de la recevoir ".

[44] John Gould ; he described *Furnarius* and *Synallaxis* in the *Zoology of the Voyage of the Beagle*, vol. 2, 1841.

[45] William Yarrell, probably personal communication.

[46] Richard Owen, " A description of a specimen of the Plesiosaurus macrocephalus, Conybeare, in the collection of Viscount Cole ", [read 4 April 1838], *Trans. Roy. Geograph. Soc.*, vol. 5, 1840, p. 534.

[47] William Whewell, *The Bridgewater Treatises on the Power Wisdom and Goodness of God as manifested in the Creation*, Treatise III, London, 1836.

extend their dominion, armed alike with the Koran & the sword ". quote Whewells Bridgewater Treatise (p. 26) about plants from Cape of Good Hope continuing for some time to flower at their own periods. — |

92 Arcana of Science & Art 1831. p. 160 account of Bulbous root from Mummy after 2000 years, germinating[48]!! — Henslow doubts?

Geographical Journal Vol. V p. 201 Wellsted Memoir on isl^d of Socotra.[49] Cattle generally marked like those of the Alderney breed, but size not larger than those of Black cattle. not have hump like those from *India* & *Arabia* p. 202 sheep have not the enormous tails, which disfigure those of Arabia & Egypt. — Civets cats only wild animals on isl^d. — Neither Hyaenas, jackals, monkeys common to either coast found here[49A] not even antelopes, though common on coast of Arabia | 93 not even antelopes though common on islets off Arabian coast. — Vol. VI. p. 89. — Lieut. Wellsted[50] " on coast of Arabia between Ras Mohammed & Jeddah ". sheep numerous " of the kinds one white with a black face, & similar to those brought from Abyssinia; the others dark brown with long clotted hair resembling that of goats ".

Geograph. Journal Vol. VII. p. 216. Mr. Bennett[51] Voyage round world. 20 years have scarcely elapsed since the Guava introduced from Norfolk Isl^d " & it now claims all the moist & fertile land of Tahiti, in spite | 94 of every attempt to check its increase. The woodlands for miles in extent are composed solely of this shrub ". — p. 229 carcases of birds drifting out to sea —

Vol. VII p. 325 Wild dogs[52] of Guayana always hunt in packs go all together colour reddish brown ears long. — like bull terrier. — Indian secured one as they always like to cross this breed p. 333. alludes to the Macusie breed no description given — |

101 A communication[52A] to Geograph. Soc. in February or March 1838 on soil in Siberia being frozen to 400 ft in depth (& Erman's[52B] suspicion that it is not 700) is applicable to metamorphosis theory suppose when rhinoceros lived mean temp 60° minus [?] then temp at depth of four hundred feet would be 60° + 6° (??) therefore 34° degrees of change have travelled that thickness in that period & no ways assisted by fluid currents which may take place in metamorphic action. — |

102 Geograph Journal vol. I p. 17 &c excellent sketch of plants of New Holland supplementary to Appendix to Flinders Voyage by Brown.[52C] — Great space seems to

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[48] *Arcana of Science & Art: or an Annual Register of useful Inventions and Improvements.* London 1831. On p. 160 " Protraction of Vegetable Life in the dry State ". " Mr. Houlton produced a bulbous root which was discovered in the hands of an Egyptian mummy, in which it probably had remained for two thousand years. It germinated on exposure to the atmosphere; when placed in earth it grew with great rapidity ".

[49] Lieut. R. Wellsted, " Memoir on the Island of Socotra ", *Journ. Roy. Geograph. Soc.* vol. 5, 1835, pp. 129–229.

[49A] From here to the end of the page added by Darwin in pencil after he had excised the page, to complete the sentence; hence the repetition on the next page.

[50] Lieut. R. Wellsted, " Observations on the coast of Arabia between Ras Mohammed and Jiddah ", *Journ. Roy. Geograph. Soc.*, vol. 6, 1836, pp. 51–96.

[51] F. D. Bennett, " Extracts from the Journal of a Voyage round the Globe in the years 1833–36 ", *Journ. Roy. Geogr. Soc.*, vol. 7, 1837, pp. 210–29.

[52] R. H. Schuckburgh, " Diary of an Ascent of the River Berbice in British Guayana in 1836–7 ", *Journ. Roy. Geogr. Soc.*, vol. 7, 1837, pp. 302–50.

[52A] K. E. von Baer, " On the ground ice or frozen soil of Siberia ", *Journ. Roy. Geogr. Soc.*, vol. 8, 1838, p. 212; " Recent intelligence upon the frozen ground in Siberia ", *ibid.*, p. 401.

[52B] Adolph Erman, letter from, *Journ. Roy. Geograph. Soc.*, vol. 8, 1838, p. 214.

[52C] Robert Brown, " General view of the Botany of the vicinity of the Swan River ", *Journ. Roy. Geograph. Soc.*, vol. 1, 1832, p. 17.

act per se as barrier — Mem. Tartary & China, both coasts of New Holland. Compare birds of Australia with plants, with this object in view.

The intimate relation of Life with laws of chemical combination, & the universality of latter render spontaneous generation not improbable. |

107 Fraser[53] remarked to me at Zoological Society, that you never find two similar groups of birds in two countries, without intermediate ones occurring in intermediate country — i.e. mundine groups. —

Waterhouse[54] tells me in insects there are many plenty of instances of insects of one tribe taking on structure (probably accompanied by habits) of other, thus in Chalcididous insects, which I brought from Australia, *probably* live in flower & have Elytra formed from development of some other part of body. — there are hemipterous insects having spiny legs & running quick & general appearance of blattae — |

108 other Hemiptera strikingly resemble Coleoptera. —

Donacia. some orthopterous insects & some third [?] have got thighs with same peculiar structure & habits of clinging to rushes similar. — The question which I more immediately want are there Heteromera which have habits & part structure like Cuculionidae. — Are there any Crysomelidae with similar habits. But the Horae Entomologicae will tell this. —

What peculiar conditions the Staphylinidae on St. Pauls Rock must be placed under. |

109 Gould[55] says most subgenera confined to continent, though we have seen species of subgenera scattered over it.

We have abundant instances of remarkable structures which as far as species is concerned superabundant. Showy [?] tail in cock peacock, widow bird. Birds of Paradise, Trogons. — the one feather in wing the curious feathers in tail of Edolius. Remarkable how small detail in structure prevail amongst the same species & subgenera in families. — thus the banded tarsi is common to all the Laniadae & Muscicapidae of new World, but not found in Old World. — |

110 If in any well developed family (Gould says)[56] there is any marked colouring of plumage (as black & white bars on wings of Trogons or lengthened rump feathers) & one species has small band & others large, then he says from long experience you may be almost sure, that there exist intermediate species. — This is remarkable & would lead one to suppose that species in same group generally contemporary. This would lead one to expect that fossil forms would generally fill up genera & not species. which is not true with shells ??? It looks as if animals perished by error. [?] |

111 It is most wonderful how in every family of birds, even the most strongly marked, there is a preeminently aerial, formed for flight & great *movement* in the air, & likewise rasorial species & likewise perching (Gould),[57] but the latter is obvious because all are so. —

Thus in Hawks there is a swallow, both in structure & habits (it cannot be doubted

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[53] unidentified.

[54] George Robert Waterhouse.

[55] John Gould; *cf. Proc. Zool. Soc.*, 1834, Part II, p. 14.

[56] *cf. ibid.*, p. 25.

[57] General statements to this effect are to be found in Gould's Introduction to *The Birds of Europe*, London, 1837, and in his *Monograph of the Trogonidae*, London, 1835–8.

that if swallow perished hawks & milvulus &c would instantly fill up their place.) — Humming bird there is strongly marked variety in the Tyrannidae. — Milvulus. —
112 Even flying woodpeckers, with powerful wings, but | tail stiff. — swallow & goatsucker likewise exaggerated. — There is one most remarkable connection between these aerial representatives of the different families. — that sexes have same plumage. — this is applicable to swallow-hawk, (this not the case in swallow ??? which is most wonderful of all? whether in most aerial of swallow) Milvulus. & still more wonderfully to the Humming bird, which is one instance of its whole family where female is not dull. — I must observe that this pre-eminent structure is not always applicable to same habits, though swallow hawk milvulus may catch insects on the
113 wing & pratancola (? connected | with Chionis), yet the Tropic bird, has very different habits, though pre-eminently belonging to this type. ?Humming bird? the woodpecker Gould says he believes does but also on fruit. —

The Rasorial type is wonderfully shown in the long legged cuckoos with claw like lark (one in Australia is called swamp pheasant) goatsucker, parrots with claw like lark (N.B. The La jeune veuve parrot though so much on the ground has not this
114 structure, instance of habit going before structure.) — | even one Kingfisher Gould has seen with long tarsi. — ground woodpecker Secretary bird. — & Mellisuga Kingii very rasorial for type. — Now here I must observe these characters vary in degree in last instance hardly at all developed. not confined to one species, but generally small genus ? are there not many ground parrots ? are there not many ground woodpeckers ? —

In each division Gould thinks he can trace structure for insects & structure for vegetation. — |

115 In conservation in Museum I could not discover any other clear relations besides aerial, & terrestrial — How is it in water birds. — there are walking forms in water birds. — but no web forms in land birds. — Groups of very different value have their representatives, the rasorial may be observed even in Lessonia &c. &c.

In relations of affinity all organs change together, in analogy certain parts perfect of typical structure certain parts changed |

116 Has S. Africa & Australia, & S. America very few forms in common, but each several with Europe & northern Asia, & Northern America. — may we not look at these Northern regions as the receptacles of the wanderers out of the rest of the world? — Will this not agree with Waterhouse[58] & mammalia. — We have clear indication |

141 have elapsed. — let these families take domestic animals with them they might be supposed to change & make genera of birds analogous. animals would be possessed by the different races of man, yet altogether different. — To make this case perfect, we must suppose men instead of mere colour & trifling form & lead on to become greatly changed in structure & even to certain degree in habits, yet we may have there analogies. — We must try [?] races of such men living in same country but
142 separated, now | if one or the other race had become eminently aquatic, (N.B. aquatic i.e. relation to element & not minding particular trades.) — then the second

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[58] George Robert Waterhouse contributed the section on Mammalia in the *Zoology of the Voyage of the Beagle*, London, 1839, i.e., published after this note was written by Darwin.

race would not obtain a cast of washing men, but might have the preexisting race, thus the analogy would not in all cases be produced. but would depend on exclusion. —

The same characters which are analogical in a genus with respect to rest of its family as in ground cuckoos, is affinity with respect to species of each other, because we suppose all descended from same. — but if two original species, each became ground, then the relation of all the ground cuckoos would not be affinity, but the truth would never be discovered. |

147 The *quantity of life* on planet at different periods depends on relations of desert, open ocean, &c. This probably on long average equal quantity, 2° on relation of heat & cold, therefore probably fewer now than formerly. The *number of forms depends* on the external relations (a fixed quantity) & on subdivision of stations & diversity, this perhaps on long average equal. |

148 The Cocos & Mar on the Mahé islands, on the higher parts & only on those & the islets separated at high water, not other islands, nor on any other part of world, no other plants peculiar to these isl^{ds}. Can not bear the least salt water. Nuts prodigiously heavy (when trees of such nature far apart, must have travelled by each tree dying & mountain torrents, but to crawl up an hill. thereby deaths !!) looks like subsidence on the islets |

161 examine structure of this bird & get account of habits.

My definition of species has nothing to do with hybridity, is simply, an instinctive impulse to keep separate. which no doubt be overcome, but until it is these animals are distinct species.

If any one is staggered at feathers & scales passing into each other let him look at wings & orbits of Penguin & then he will cease to doubt : Scales into Teeth in Bony Pike (Waterhouse) |

162 It would be curious to know whether variety could be transmitted more easily in those born without coitus, than with. Magazine of Zool. & Bot. Vol. II p. — Dr Johnston[59] on Entomostraca Daphnia produce young, capable of producing young many times & lay two sorts of eggs. one remaining through winter. Might be given as a hopless difficulty, except as distinct creation. — Generation may be viewed as condensor. Must (on my theory) — supported by foetal lower developed forms. — (N.B. Waterhouse says of *affinity* of many insects may be told by their larvae) but the acts of condensing must alter method of generation. — Heaven knows how. — This reaction takes place in every organ. Hence method of generation is very good general character in those animals where much change has been added, as it speaks to amount of change only & not kind : insects, vertebrata — plants. at first classification on generation might appear convention |

183 Erasmus[60] says he has seen old stallion tempted to cover old mare by being shown young one. —

Many African monkeys in Fernando Po — no new *forms* only species!

No salamanders (D'Orbigny Rapport p. 11) in S. America so highly developed in North.[61] — Icht[h]iology of S. America more peculiar than its ornithology p. 12 do. excepting salmons.

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[59] W. Baird, " The natural history of the British Entomostraca ", *Magazine of Zoology and Botany*, vol. 2, 1837–8 ; on p. 406 : " it is ascertained that one single copulation is sufficient not only to fecundate the mother for her life, but all the female descendants for several successive generations ". The reference to Johnston is obscure.

[60] Erasmus Alvey Darwin, Darwin's elder brother.

L'Institut Sorex from Mauritius[62] p. 112 ; & paper on genus. |

184 Magazine of Zool. & Bot. Vol. I, p. 456 4 instances of hybrids between pheasant & Black fowl.[63] — use as argument possibly some few hybrids in nature. —

p. 473 Webb & Berthelot[64] must be studied on Canary islands.[64A] Endeavour to find out whether African forms (anyhow not Australian) on Peak. Did Creator make all new, yet forms like neighbouring continent.
Chapter ten translated by Hooker. — my theory explains this but no other will. St Helena (& flora of Galapagos ?) same condition Keeling Isld. shows when proper dampness seeds arise quick enough. Vegetation of Peak altogether original[65] owing to being oldest & having undergone change ? ? no near lofty country p. 475. N.B. This bears on fossils of Europe, those species which can migrate remaining constant in form, others altered much. these others will be plants & land animals & land shells — all in short. Extreme North = to peak of Tejde in relation to surrounding countries & present tropical count[ries . . .

185 p. 564 an abstract of Mr. Swainsons[66] views which if abstract true are *wonderfully* absurd. —

p. 565 Scotch wild Cattle breed freely with the tame.[67] Vol. II Magazine of Zoology p. 56 Peregrine Falcon holds *birds* for some time alive ? therefore other species mice & only kills them when urged by hunger.[68] —

p. 65. Aberrant groups[69] few in numbers & vary much in character, divided into many small genera ∵ circumstances not favourable to many species. same circumstances which by causing death makes the group aberrant |

186 When species rare we infer extermination when group few in number of kind. extermination. — New forms *made* through probably an infinite number of forms. — therefore an isolated form probably a remnant. — Pachydermata & Horses few forms & they are remnants. — Cephalopoda ditto. —

Mag. of Zool. & Bot. Vol. II p. 125. Allusion to abortive spiracles in Hemiptera.[70]

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[61] Alcide D'Orbigny, *Voyage dans l'Amérique méridionale, . . .,* . . .

[62] *L'Institut*, avril 1838, p. 112, " Le *Sorex sonneratii* . . . deux exemplaires recueillis par les frères Verreaux dont l'un provient de Java et l'autre de l'île Maurice ".

[63] William Thompson, " On hybrids produced in a wild state between the Black-Grouse (*Tetrao tetrix*) and common Pheasant (*Phasianus colchicus*), *Magazine of Zoology and Botany*, vol. 1, 1837, p. 450.

[64] P. Barker Webb & S. Berthelot, *Magazine of Zoology and Botany*, vol. 1, 1837, p. 473 : " 'Aspect général de la végétation des îles Canaries ' has been already well translated in Dr Hooker's Botanical Miscellany ".

[64A] P. Barker-Webb & S. Berthelot, *Histoire naturelle des Iles Canaries*, Paris 1836.

[65] *Magazine of Zoology and Botany*, vol. 1, 1837, " Reviews and critical analysis (Histoire naturelle des Iles Canaries) ", p. 475 : " The Peak itself, the " Teyda ", the vegetation of these wild regions is found to be altogether original ".

[66] *Magazine of Zoology and Botany*, vol. 1, 1837, pp. 545–66, " Dr Lardner's Cabinet Cyclopaedia. Natural History, 1. On the Geography and Classification of Animals. By W. S. Swainson ".

[67] *ibid.*, p. 565, " We know, beside, that they breed freely with the common ox, and that the progeny produced from the cows is also productive ".

[68] William Thompson, " Contributions to the Natural History of Ireland ", *Magazine of Zoology and Botany*, vol. 2, 1837–8, pp. 42–57 ; on p. 53 : " still retaining its first victim, secured the second with its other foot, and bore both off together ".

[69] G. Johnston, " Miscellanea Zoologica ", *Magazine of Zoology and Botany*, vol. 2, 1837–8, pp. 63–73.

[70] John Obadiah Westwood, " Notes upon Sub-aquatic Insects, with the description of a new Genus of British Staphylinidae ", *Magazine of Zoology and Botany*, vol. 2, 1837–8, pp. 124–132.

do. p. 160. Soft plumage of night jar like owls.[71] analogy in habits adaptation to nocturnal habits — to cats &c. — must be acquired by my theory else my theory not applicable |

205 L'Institut 1838 p. 128 Extraordinary genus Mesites bird from Madagascar uniting pidgeons & gallinaceous birds & parrots.[72] — legs of pidgeon perfect. — &c. &c. do. p. 136 Ichthyosaurus in the Chalk.[73]

Those who say philosophically to a certain extent, nothing but experience will tell us when group is true, — there are no genera if mammalia are adduced, say oh look to your fossils, now if extinction had gone, without creation this would have been fair, but to place all that ever have lived into one list is unfair (moreover what will become of the future creations, if the list is now perfect. —) the creator so creates animals, it will be said, that although at any one there are gaps yet altogether he has created a perfect chain *** supra on next page |

206 It is a fact pregnant with SOMETHING? that intermediate species have generally perfect organs of two adjoining families & not *all* organs blending away. — do changes of habits affect particular organs. —

***Hopeless work to systematist, who believed that all his divisions merely marked his own ignorance. The collector was plodding at making a series, which would render our knowledge a chaos : who will doubt this if series now existed from man to monad — though physiology would profit if the series were believed to pass into each other. —

Different classes keep to their types with different degrees of closeness — look how close birds ! look at Mammals. how wide. — therefore birds younger ???! or have not been exposed to so many contingencies ??? |

209 some of the Ostriches were to die, then they would appear isolated.

In my birds from S. Hemisphere there are some godwits which are close to European species. and the sexes of which vary in colour of plumage in same remarkable manner as European species = singular coincidence if distinct creation. — i.e. — a mere statement nothing is explained. — this is fact analogous to mocking thrush of Galapagos having tone of voice like S. American. —

Have not Ruffs & Reeves a remarkably varying plumage for wild birds — |

210 At Zoolog. Garden there is half Jackal & Scotch Terrier — certainly more like Jackal in *gait*, size, fur ; manner in which ears droop like dog in character, & manner of wagging tail habitual movement connected with mood. —

There is no progression in the development in instincts in the orders of insects, so is there none of reason in orders of mammals. — Mem. Elephants & dog.

There is one living spirit prevalent over this world. (subject to certain contingencies of organic matter & chiefly heat), which assumes a multitude of forms each having acting principle according to subordinate laws. — There is one thinking sensible principle (intimately allied to one kind of |

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[71] W. B. Clarke, " Observations on *Caprimulgus europaeus* (night-jar) ", *Magazine of Zoology and Botany*, vol. 2, 1837–8, pp. 158–63.

[72] M. Bernier, *L'Institut*, tome 6, 1838, p. 128 : " [Mesites] analogue par ses pattes au Pigeon plus qu'à aucun autre group. par ses ailes à la plupart des vrais Gallinacés ".

[73] A. Courcier, *L'Institut*, tome 6, 1838, p. 136 : " Présence de l'Ichthyosaure dans la craie ".

213 Major Mitchell[74] is not aware that Australian dogs ever hunt in company — marked difference with dogs of La Plata & Guyana — people will say not species. —

Organs of generation a capital character (Owen)[75] not for first & grandest division. but for one of very high order. not for vertebrata. but mammalia & reptiles &c.

Timor is connected with Australia — Map to King's[76] Australia — by a bank of soundings of which there appears to be one line in which greatest depth is not more than 60 F. & in the whole area 120 is greatest (about 200 miles distant). — directly beyond produced line of Timor 213. What productions Sandal Wood Isl^{d}.? ought to agree with Java ?? |

214 Terrestrial Planariae assuming bright colours; good instance of colours dependent on localities. —

Hamilton will give an account in his Travels in Asia Minor of the domestic animals. At Angora Centre of Asia Minor are the fine haired goats, which it is said cannot be transported from their country. — the long-haired cats are supposed to come from there. — All the sheep are thick-tailed. The dogs called Persian greyhounds are Kurdish & come also from Asia Minor. — tail like setters. long ears — colours vary, but form constant. — |

215 These abortive organs in some males animals, mammae in man, capable of giving milk.

The females of some moths, like glowworm have rudimentary wings so nature can produce in sex what she does in species of Apterix.

This is important because if these abortive wings in the female are allowed to the fully organized wings of the male rendered abortive in the womb — if these apparently useless organs do indicate such origin, then we are bound to consider abortive organs of same tendency in species. this is capital & novel argument. — (there is paper by Yarrell[77] in Zoolog. Transactions & Hunter[78] on this subject). Are there any abortive organs in neuter bee, because if so as she can be converted into female, it will be splendid argument. Old female turning into cocks. abortive spurs growing. — |

216 Are there any abortive organs produced in domesticated animals. in plants I presume there are ? get examples. — for instance where a tendril passes into a mere stump. — Shall abortive organs of very same kind in these cases, have plain meaning and none in other case!

Savigny[79] has shown same fundamental organs even in Haustellata & mandibulata. — !! Argument where general argument is extended from species to genera & classes.

p. 479. fragment of tusk & molar tooth of Hippopotamus from Madagascar[80] !!!!!! Proceedings of Geolog. Soc. Vol. I.

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[74] Thomas Livingstone Mitchell, *Three expeditions into the Interior of Eastern Australia*, London, 1838.

[75] Richard Owen, " Remarks on the Entozoa ", *Trans. Zool. Soc.* vol. 1, 1835, p. 387.

[76] Philip Parker King, *Survey of the Intertropical and West Coasts of Australia*, London, 1818–22.

[77] William Yarrell. Reference untraced.

[78] John Hunter, *Observations on certain parts of the Animal Oeconomy*, with notes by Richard Owen, London, 1837, pp. 422–66 : " Observations on Bees ".

[79] Marie-Jules-César de Savigny, *? Mémoires sur les animaux sans vertèbres*, Paris, 1816.

[80] *Proc. Geol. Soc.*, vol. 1, 1833, p. 479, " A letter was afterwards read from Mr Telfair to Sir Alexander Johnson, accompanying a specimen of recent conglomerate rock from the island of Madagascar, containing fragments of a tusk and part of a molar tooth of a hippopotamus ".

It is capable of demonstration that all animals have never at any one time formed chain, since if cretaceous period assumed, then some perished before. carboniferous some perished |

221 male glow worm knowing female good case of instinct. bees turning neuter into Queen. more wonderful case.

Dwight's[81] Travels in America, speaks of short-legged sheep, hereditary proceeding from an accident. New England farmer — useful could not leap fences : — Dr Lang[82] (quoted) on Polynesian nation p. 4. — do. p. 186 quote Burkhardt[83] to show black colour of certain Arabs. — N.B. avoid quoting these hackneyed cases. |

222 Mr. Edw. Blyth[84] does not believe in circular or linear arrangement. — Thinks passage very rare, in anatomical structure. — the passage between owls & hawks only external. intermediate groups often have full structure of one class & full of second — this class if analogous to petrel-grebe external appears to be a puzzle against my theory. —

If I be asked by what power the creator has added thought to so many animals of different types, I will confess my profound ignorance. — but seeing such passions acquired |

225 element of extreme difficulty in mundine geological chronology.

Annals of Natural History Vol. I ?? p. 318 some remarks on Bonaparte's[85] list of birds in Europe & N. America on closely allied species replacing each other. good to consult.

p. 326 wild ass extending over 90° of Long. & Col. Sykes[86] alludes to some other case of 180° & great diff. of Lat^{d}.

p. 355. Echidna of Van Diemen's land & Australia different.[87] Temminck Fauna Japonica (??) 82 Mammalia[88]

p. 293 Phalangista[89] of Australia & Van Diemen's land diff. — |

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[81] Timothy Dwight, *Travels in New England and New York*, London, 1823.

[82] John Dunmore Lang, *Origin and migrations of the Polynesian nation*, London, 1834.

[83] John Lewis Burckhardt, *Travels in Arabia*, London, 1829.

[84] Edward Blyth, " Observations on the various seasonal and other external changes which regularly take place in Birds, more particularly in those which occur in Britain ; with Remarks on their great Importance in indicating the true Affinities of Species ; and upon the Natural System of Arrangement ", *Magazine of Natural History*, vol. 9, 1836 pp. 393–409 ; on p. 407 : " [referring to those who] hold that every natural assemblage of species, great or small, forms part of some quinary circle. Now, I cannot but observe here . . . I should think that a due consideration of this first *binary* distribution must at once carry conviction of the mind, must be at once a most unanswerable argument against all quinary or similar doctrines . . ."

[85] Charles Louis Bonaparte, Prince of Musignano, " A geographical and comparative list of Birds of Europe and North America ", *Annals of Natural History*, vol. 1, 1838, pp. 318–320.

[86] *Annals of Natural History*, vol. 1, 1838, p. 322, " Proceedings of Learned Societies . . . A Paper was read by Colonel Sykes, ' On the identity of the Wild Ass of Cutch and the Indus, with the Dzeggetai (Equus hemionus of Pallas) '."

[87] *Annals of Natural History*, vol. 1, 1838, p. 335 : " Miscellaneous ". . . . On the two species of Echidna, by J. E. Gray. " Sir E. Home, in his paper in the *Phil. Trans.* for 1802, figured two specimens of this animal, and Cuvier (Règne Animal, vol. i, p. 225) considered them as two species, naming the one *Echidna Hystrix*, and the other *E. setosa* ; but most succeeding zoologists have regarded them as a single species . . . The *E. Hystrix*, Cuv. . . . came from the continent of New Holland, while *E. setosa*, Cuv. . . . is confined to Van Diemen's Land ".

[88] *Annals of Natural History*, vol. 1, 1838, p. 335 : " *Miscellaneous* " . . . " Zoology of Java ". " Temminck, in the Fauna Japonica, states, that he knows 82 kinds of mammalia, 455 birds, and 90 species of amphibia, as inhabiting that Island, although the interior is almost entirely unknown ".

[89] John Edward Gray, " A reply to Mr Ogilby's Communication to the Annals of Natural History respecting Phalangista cookii ", *Annals of Natural History*, vol. 1, 1838, pp. 293–7.

226 Habits can only be used in classification as indication of structure (including
brains & other organs difficult to analyse). will not this separate facts about abortive
organs &c.

The doctrine of monsters[90] is preeminently worthy of study on the idea of those
parts being most easily mortified which last produced — insane men in civilized
countries — this is well worthy of investigation. |

227 Institut 1838 p. 174. Aperçu very good on insectivorous quadrupeds — geographical range very good. — Blainville[91]

Ovington's[92] voyage to Surat floating isl^{d} off coast of Africa p. 69 with tall grass.
p. 72 hairy sheep —

Edinburgh Transact Vol. IX p. 107 An Ascaris inhabits the eyes of horses in
India in which it may be seen swimming about.[93]

A. Smith[94] is firmly believed in representation. certain birds in many families,
& very often in number 55 will have long tail. — in raptorial birds, & tigers & sharks,
being spotted & colours of little value |

228 Dr Smith[95] if black & white man crosses, children heterogenous, he feels sure of
this, first offspring most like mother. — like dogs Smith knew chinese hairless dog
& common spaniel crossed. — 3 puppies *perfectly* like chinese & 3 perfectly like
spaniel even when grown up. — Are mules homogenious owing to no attempt to
keep up offspring, are not half lion & tigers ditto. (see Griffith)[96] & half Muscovy
ducks, black cock & pheasant see Jardine's Journal.[97] — consult on this point —
pigs always go against this, without number of vertebra new acquisition, we must |

237 ∴ Those animals, which only propagate by scission can not alter much ? !

Mr. Brown showed me Bauer's[98] drawings of a curious plant where a tube consisting of pistils & stamens united into long organ, moved on being touched, so as to
protect itself, one segment of the corolla being (probably) smaller to allow it to lie on
one side. — but in other species, this segment is converted into hood which possesses
238 power of movement & not the organ itself | How except by direct adaptation has
such a change been effected. — the consciousness of the plant that this part must be
protected however it may be effected. —

Prodromus Florae Norfolkicae. 1833 Steph. Endlicher[99] (He will give sketch of

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[90] John Hunter, in Richard Owen, *Descriptive and illustrated Catalogue of the Physiological Series of Comparative Anatomy contained in the Museum of the Royal College of Surgeons in London*, London, 1833, vol. 1, p. iv.

[91] Henri-Marie de Blainville, *L'Institut*, tome 6, 1838, p. 174, Zoologie : Mammifères Insectivores.

[92] John Ovington, *Voyage to Suratt* 1689, London, 1696.

[93] Alexander Kennedy, " Account of a non-descript Worm (the Ascaris pellucidus) found in the eyes of Horses in India ", *Trans. Roy. Soc. Edinburgh*, vol. 9, 1823, p. 107.

[94] Andrew Smith, possibly personal communication.

[95] ditto ; *cf.* also Edward Blyth, " An attempt to classify the varities of animals ", *Magazine of Natural History*, vol. 8, 1835, pp. 40–53 ; on p. 52 : " The mixed offspring of different varieties of Man thus generally blends the character of each, though instances are not wanting of its entirely resembling . . . either one or the other of its parents ".

[96] Edward Griffith, *The Animal Kingdom arranged in conformity with its organization, by the Baron Cuvier . . . with additional descriptions of all the species*, London, 1827.

[97] William Thompson, " On the hybrids produced in a Wild State between the Black-Grouse (Tetrao tetrix) and the Common Pheasant (Phasianus colchicus), *Magazine of Zoology and Botany*, vol. 1, 1837, p. 450.

[98] Ferdinand Bauer, in Matthew Flinders, *A Voyage to Terra Australis*, London, 1814, vol. 2.

[99] Stephan Ladislaus Endlicher, *Prodromus Florae Norfolkicae ; sive catalogus stirpium quae in insula Norfolk annis* 1805–5 *a Ferdinando Bauer collectae* . . . Vindobonae, 1833.

botany of islands of south sea says so in preface. — Mr. Brown[100] says character of
Flora N. Zealand & N. Caledonia with a dash of New Holland. same species as in
239 N. Zealand — Some species of Australian Genera | same (Palm & &hormium tenax)
as in New Zealand & Australia. some SPECIES of AUSTRALIAN GENERA ∴ good case.
rather large flora (150 ?)

Mr. Brown did not observe scarcely any Australian character in Timor plants,
yet it seems there may be Eucalyptus! — (Hostile fact)

Be cautious about Goulds[101] case of birds of Van Diemens land & Australia. —
The wombat (Brown)[102] is found in Is^{d} of Bass's Straits |
240 The common mushroom & other cryptogamic plants same in Australia &
Europe.[103] — if creation be absolute theory, the creation must take place as when
creator sees the means of transport fail. — otherwise no relation between means of
transport & creation exists. — pool may have been created at many spots & since
disseminated.

See Habits of Malay fowls[104] p. 5 (note) on some papers on instincts[105] |
241 L'Institut 1838 p. 184 Botany of Bonin[106] " grande *analogie* avec la Flore du
Japon ", some European & Sandwich species & some of Japan. I do not understand
any new ones. — Memoir will be published St. Petersbourgh Academy Imperial.
Paper read in 1837 semestre..

I suspect some valuable analogies might be drawn between habitual actions of
plants when exciting cause is absent & memory of animals. — (surely in plants |
242 movements effects of irritability, though means injection of fluid different from
contraction of fibre) — it is most remarkable habitual action in plants, it allows of
any degree in lowest animals habitual action in intestines subject to sympathetic
nerves —

The vividness of first memory in children or rather their memory. very remarkable
— scenes in themselves accidental — my first thought of sea side — |
249 N.B. I met an old man who told me that the mules between canary birds & goldfinches
differed considerably in their colour & appearance. Every now & then —
short-tailed *cat* ?cut? has its offspring short tails/one born at Maer

Tuckeys Voyage[107] p. 36 " Cercopithecus sabaeus " said to be monkey of St Jago
C de Verds ; same as on coast of Africa. — Macleay tells me same thing. p. 55.
40 leagues from land several patches of reeds & trees.[108] p. 259. 120 ft in length.

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[100] Robert Brown, in Matthew Flinders, *A Voyage to Terra Australis*, London, 1814, Appendix III ; possibly also personal communication.

[101] John Gould, *Synopsis of the Birds of Australia and the adjacent islands*, London, 1837–8.

[102] *Proc. Zool. Soc.* 1836, p. 49, the wombat " was brought from one of the islands in Bass's Straits ".

[103] Robert Brown, in Matthew Flinders, *Voyage to Terra Australis*, London, 1814, Appendix III, p. 539 : " southern extremity of Van Diemen's Island, where the necessary conditions exist, the relative proportion of Cryptogamous plants is not materially different from that of the south of Europe ".

[104] reference untraced.

[105] John Oliver French, " An inquiry respecting the true nature of instinct, . . . " *Zoological Journal*, vol. 1, 1825, pp. 1–3, 153–173, 346–366.

[106] Heinrich Gustav Bongard, *L'Institut*, tome 6, 1838, p. 184, " Mémoire sur la végétation des Iles de Bonin " ; original in *Bull. Scient. Acad. Imp. Sci. Saint-Pétersbourg*, tome 2, 1838, pp. 369—372.

[107] James Kingston Tuckey, *Narrative of an Expedition to explore the River Zaire, usually called the Congo* 1816 . . ., London, 1818.

[108] *ibid.*, p. 55, " When forty leagues from the land, several floating patches of reeds and trees passed us ".

some branches of Justicia still growing passed us.[109] |

250 do. p. 243 (Professor Smith's Journal) on the heights of St. Jago found a Euphorbia so near Piscatoria as scarcely to be distinguished from it.[110] — & several old acquaintances which grow on the lower region of the Canary islands. — p. 250 admirable table of plants of St. Jago showing many common to Canary isl^{d}, Europe, & St. Jago upper region, & some to Cape. — some proper well worth studying, with

251 respect to forms. — | Study Appendix[111] to Tuckey's Expedition

Journal of the Academy of Natural Sciences of Philadelphia Vol. VII Part II 1837 accounts of the various hares some since discovered of N. America,[112] & of the shrews.

Dr Bachman[113] told me that near Charleston ? three species near New York (600 miles N. ?) replaced by three other species. — Says all the hares West of Rocky Mountains have peculiar character in extreme length of ears & length of limbs, so

252 that he first thought only one species. & all hares on East side have other | peculiar appearances. Now this is precisely the case with the mice of S. America with respect to the Cordillera. — Bachman has seen webbed shrew. case of adaptation. — (case of Squirrel from extreme north turning white like Hares ?) I never saw more beautiful adaptation for snow like snow shoes than feet & hind legs of these white hares, fitted for region of snow. — |

257 In Holme's History of Man at Maer,[114] it is said the Samoyed women (?North end of the Oural mountains) have black nipples to their breasts. —

L'Institut, 1838, p. 230 says the Macrotherium of Europe is between the anteater of Good Hope & those of S. America.[115] — Are not some of the Australian fossils intermediate between those of Van Diemen's land & Australia proper. — Irish Elk case of fossil geographical range. |

258 [blank]

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[109] *ibid.*, p. 259, " 120 feet in length and consisting of reeds resembling the *Donax*, and a species of *Agrostis*, among which were still growing some branches of *Justicia* ". These notes show that Darwin was already concerned with the survival of land organisms in sea water.

[110] *ibid.*, p. 243, " I found at last *an* Euphorbia, that bore so near a resemblance to *piscatoria* as scarcely to be distinguished from it ".

[111] *ibid.* Appendix V, p. 420, is by Robert Brown, "Observations, Systematical and Geographical on Professor Christian Smith's Collection of Plants from the Vicinity of the River Congo."

[112] John Bachman, " Observations on the different species of Hares (genus *Lepus*) inhabiting the United States and Canada ", *Journ. Acad. Nat. Sci. Philadelphia*, vol. 7, 1837, p. 282.

[113] *ibid.*, p. 358 ; also personal communication.

[114] Henry Holme, Lord Kames, *Sketches of the History of Man*, London, 1774.

[115] Henri-Marie de Blainville, " Dépôt d'ossements fossiles de Sanson ", *L'Institut*, tome 6, 1838, p. 230 : " *Macrotherium*, qui démontre en Europe l'existence d'un genre intermédiaire au Pangoline et à l'*Orycteryx* d'Afrique et aux Fourmiliers d'Amérique ".

Pages excised from Third Notebook

III

5 W. D. Fox[1] has a cat which he bought in Portsmouth, said to come from coast of Guinea, — ears bare, skin black & wrinkled — fur short (tail cut off in progeny peculiar) limbs very long, eyes very large, very fierce to dogs. — otherwise habits not different; tone of voice perhaps rather different. Crossed with common cat, exact variety unknown, three kittens alike each other, partaking very closely of form of mother: more than of the common cat. — ([in pencil:] Ch IX Mongrels Hybrids) Fox has *half* Persian cat which bred with unknown common house cat. — had four
6 kittens. two appeared | so very like common cat, that they were killed & other two very closely resembled in form of tail, fur &c. to the half bred Persian. — Here then we have clear case of heterogenous offspring from one impregnation. ?is this one impregnation, or two impregnations one giving half character & other more of English, but the effect is the same. —

7 Fox thinks that when a *wild* animal is crossed with a | tame, offspring always takes most after wild. — i.e. that no domesticated ones have been so long as wild one under present form. — Fox has seen several cases of foxes and dogs crossed. offspring always more resembled foxes than dogs (mem Jackal in Zoolog. Gardens) He has seen in a show half wolf & half Esquimaux dog which appeared to be intermediate between two parents. — this is very interesting as Esquimaux dog approaches to species. Again he has seen several crosses between Esquimaux dog & common
8 dogs & Fox thinks they decidedly take | much more after Esquimaux. — this agrees perfectly with Yarrell[2] & no leading question was put. —
Fox thinks half Lion & Tigers are exactly intermediate in character & kittens alike each other. —

Even in children of parents one sometimes resembles one parent & one another & are not exactly intermediate. — |

11 & another leader mare. — this stallion though eager to all other mares had been entirely broken from these mares, (though horsing every month) & worked in the same cart in loose chains, by being at first beaten from her, & always accustomed to her. — even parallel to brothers & sisters in mankind. —

The case of all blue eyed cats (Fox has seen repeated cases) being deaf curious case of corelation of imperfect structure. — |

12 Fox says in Lord Exeter's Park or in the Duke of Marlborough there is a breed of white-tailed squirrels, which form a marked *wild* variety. doubtful whether all are white. Fox says half Muscovy.

Fox says a settler near Swan river lost his two cows entirely, changed his residence a great many miles — yet one day a cow walked in, then disappeared, & three days afterwards came again, bringing with her the other & younger cow. — |

29 Mr. Blyth[3] remarked that greater difference in the 4 Struthionidae, than in many large orders of birds. The Emu & Cassowary closest. — Ostrich & Rhea closest. —

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[1] William Darwin Fox, personal communication.

[2] William Yarrell; this and the following pages read like notes taken at a discussion meeting of the Zoological Society.

[3] Edward Blyth.

(& 2 Rheas still closer). — Mr. Blyth asked whether structure of pelvis &c was not adaptive structure, like little wings of Auk which does not make that bird a Penguin. — (i.e. whether relation in one point or many) Owen[4] answered that all characters might be considered as adaptative and that he did not see where the line could be drawn. — thus the most remarkable character in Apteryx, small respiratory system ; 30 even much smaller | than in other Struthios was adaption to little movement. — nocturnal crawling bird. — Wings reduced to rudiment. — clavicle scapula &c. strongly developed to aid in breathing. —

Animals from Hobart Town mentioned, it seems most of species from there now found in Australia. —

New species of Moschus characterized by Ogilby.[5] who observed that the young of this animal which is so anomalous among true deer yet is spotted like so many deer. — very curious like some facts of Mr. Blyth on birds. — |

31 Dr Bachman[6] tells me line of Rocky Mountains separates almost all Mammals of N. America & many birds, which however are most closely represented. — Thus the red breasted thrush is separated by one not differing except by black line. — A Bunting by one only differing by some permanent white streaks. — &c. &c.

Dr Bachman has crossed cock Guinea Fowl with Pea Hen. — offspring female, 32 yet so infertile never even in seven years produced even an egg. — | a most curious bird, did not seem to know itself, at last associated with the ducks. — most *strange voice* often in the night, like peacock. — tail as long as Pea hen. — about intermediate. — (In Zoolog. Garden there is hybrid of Penguin duck a variety of Muscovy with *goose* !!)

Dr Bachman regularly breeds in Carolina for his table Muscovy & common ducks — they are produced in full equal numbers with pure bred (just like common mules) 33 & lay many eggs but never produce inter se or with | parent species. — The hybrids do not vary (i.e. the hens all alike & cocks all alike) more than parent species. — Mr. Blyth remarked only near species or varieties produce heterogenous offsprings. — are not the hybrid pheasant & grouse different — (if so chinese pigs & common must be considered as distant species ?? or is time the varying element). Then do those *species* which breed most freely & produce somewhat fertile offspring produce heterogenous offspring.

It appears certain that hybrid Muscovy & common duck have been shot wild (escaped from Carolina)? off New York. therefore instincts not imperfect. Are Pheasant & Grouse homogenous? |

34 I observe Bachman calls these *Hybrids new* species.

Yarrell says the bird fanciers say the throw of any two species crossed is uncertain.

Yarrell remarks he has somewhere met conjecture that all salt-water [recte fresh water] fish were once salt water (as they almost must have been on elevation of continents) but Ogilby well answers that nearly all F.W. Fish are Abdominals ∴ that order first converted. — is it an old order geologically? |

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[4] Richard Owen.
[5] William Ogilby.
[6] Rev. John Bachman.

53 will come from common stock. — all genera common stock — so that values can only be judged if in each separate line of descent. — & here limits of varieties being constant it would be exceedingly wrong to call one group genus & other subgenus. — Propagation best rule for genera, & so mount upwards, judged by analogy. — Consider all this.

N.B. How can local species as in Galapagos, be distinguished from temporal species as in two formations ? by no way.? — |

54 " Natura nihil agit frustra " as Sir Thomas Browne[7] says " is the only indisputable axiom in Philosophy Religio Medici Vol. II Sir T. Browne's works p. 20.

" There are no grotesques in nature ; not anything framed to fill up empty contours, & unnecessary spaces " p. 23 " for Nature is the act of God " — after Decandolles idea

Septemb 1. It has been argued man first civilized add this in note. ?mere conjecture? — Australians. — Americans &c. |

55 Septemb. 1. Macleay[8] & Broderip[9] when talking of some Crustacean, like Trilobite (Polirus ??) female blind & quite different form from male with eyes! — (are not these differences in sex confined to annulosa?) remarked that young of Cirrhipedes can move & see, parents fixed, — young of sponges move. — young of Cochineal insects move about & see, parent female fixed & blind : — Macleay observed all these *facts* proves that *perfection* of organs have nothing to do with *perfection* of individual, though such relation seems common, but the perfection consists in being able to reproduce. |

56 Here there is some error — Observed, nature does nothing in vain, therefore organs fitted to animals place in creation. — thus senses, especially sight connected with locomotion. (Mem. Dr. Blackwell (Abercrombie)[10] comparison of sight to threads.) — Hence the *Pecten* which moves imperfectly has eye-point, but Brodrip added it has been stated that stationary Spondylus has eye-points — Macleay then answered, because nature leaves vestiges of what she does — does not move per saltum — yet does nothing in vain!! |

61 Waterhouse knows three species of Paradoxurus[11] common to Van Diemen's land & Australia. Well developed mammae in male ourang-outang other point of resemblance with man.

September 31^{d} Magazine of Natural History[12] 1838 II p. 492. Mr. Gould[13] on Australian birds, all Eagles of Australia characterized by wedge tails, many of the hawks are analogous to European birds. also do. p. 403 & 404.

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[7] Sir Thomas Browne, *Works*, edited by S. Wilkin, London, 1835–6.

[8] William Sharp MacLeay.

[9] William John Broderip (*cf. Life & Letters of Darwin*, 1887, vol. 1, p. 274).

[10] ? John Abercrombie, *Inquiries concerning the intellectual powers and the Investigation of Truth, London*, 1838.

[11] By " Paradoxurus " Darwin meant *Ornithorhynchus paradoxus* ; personal communication from George Robert Waterhouse.

[12] Under the abbreviation " Magazine of Natural History ", Darwin has confused two different publications which, unfortunately, both published a volume 2 in 1838 : they were, *Annals of Natural History or Magazine of Zoology, Botany and Geology*, and, *Magazine of Natural History*.

[13] John Gould, *Birds of Australia and the adjacent islands*, London, 1827–8. Neither journal mentioned in the previous footnote in vol. 2, p. 402 has a paper by Gould, but *Mag. Nat. Hist.* vol. 2, 1838, has, beginning on p. 399, a paper by Brehm, " Observations on some of the domestic instincts of Birds " ; on pp. 402–4 there are references to birds of prey.

Vol. II do. (p. 71) allusion to Eyton's discovery of different number of vertebrae in Irish[14] & English hare. good case these hares compared to South American hares, many species separated by mountains &c &c &c |

62 do. p. 69, a Dr Macdonald[15] believes the Quaternary arrangement & not the Quinary. anyone may believe anything in such rigmarole about analogies & numbers.

L'Institut p. 275 (1838) Mr Blainville[16] has written paper to show Stonesfield Didelphis not Didelphis. answered satisfactorily by Valenciennes.

The change from caterpillar to butterfly is not more wonderful than the body of a man undergoing a constant round, each particle is placed in place of last by the ordering of the nerves, but in different parts according to age of individuals (see
63 mammae of women) in different parts when age | *changes* caterpillars into Butterfly. When two varieties of dog cross, Erasmus says it looks like . . . |

64 Institut 1837 p. 351 Paradoxurus Philippensis. Phillipines . . .[17] |

73 as at present in new Ireland & continent since grown. — This will explain S. American case of Didelphis being mundine form., & the less development of Marsupials in S. America. from presence of Edentata — Edentata & Marsupials have been almost destroyed wherever other animals existed. —

Athenaeum 1838. p. 654 Reason given for supposing Tetrao Rakkelhan a hybrid produced commonly in Nature both in Sweden & anciently in Britain) between *hen* Capercailkie & cock Black-cock.[18] — (Curious the readiness with which this genus becomes crossed. ?is red game an hybrid? — |

74 When I show that islands would have no plants were it not for seeds being floated about, — I must state that the mechanism by which seeds are adapted for long transportation, seems to imply knowledge of whole world — if so doubtless part of system of great harmony.

The peculiar character of St. Helena. — contrast with Otaheiti in relation (See Gaudichauds[19] Volume on the Botany of the Pacific.) to nearest continent. — with respect to ancient geography of Atlantic Tristan D'Acunha ditto. Juan Fernandez do |

87 which is often the case, & why should organic affections always influence the sexual organs alone. —

It is singular pheasant & fowl being so totally infertile whereas animals further apart have bred inter se. —

These hybrids are very wild & take in disposition after their pheasant parents. —

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[14] William Thompson, " On the Irish hare ", *Ann. Nat. Hist. or Mag. Zool. Bot. & Geol.*, vol. 2, 1838, p. 70 ; on p. 71 there is an allusion to Thomas Campbell Eyton's discovery that the tail of the Irish hare is shorter and has 3 less vertebrae than the tail of the English hare.

[15] *Ann. Nat. Hist. or Mag. Zool. Bot. & Geol.*, vol. 2, 1838, p. 69 reports a verbal communication to the Royal Society of Edinburgh on 9 April 1838 by Dr Macdonald.

[16] Henri-Marie de Blainville, " Doutes sur le prétendu Didelphe fossile de Stonefield [*sic*] ", *L'Institut*, tome 6, 1838, p. 275.

[17] *l'Institut* 1837. p. 351 " . . . Zoologie : *Mammifères nouveaux*. — M. Jourdan présente un mémoire dans lequel il décrit cinq Mammifères . . . 5° Paradoxure des Philippines (*Paradoxurus Philippinensis* J.) . . . "

[18] *Athenaeum*, 1838, p. 654 : " Dr Charlton exhibited a specimen of *Tetrao Rakkelhan*, of Temminck, and read a short notice, to prove that this bird, though described as a distinct species, . . . was in fact nothing but a hybrid, between the hen caperzailzie and blackcock ".

[19] Charles Gaudichot-Beaupré, *Botanique du Voyage autour du monde fait sur l'Uranie et la Physicienne*, Paris, 1826. The author of the entire work is Louis de Freycinet.

(There are some 3/4 birds of which I think there must be some mistake in their origin)

Saw cross between Penguin Duck from Bombay & Canada Goose. — Former strange mishaped bird & looks very artificial bred but Mr. Muller says that breeds 88 larger numbers, & rears an | unusual number out of any one nest, even more than common duck — Male Penguin was crossed with hen Canadian offspring, I should say in every respect most like Penguin duck. — *which is strange anomaly in Yarrells Law.*[20] — it probably is explained by the vigour of their propagating powers. (as if they were a good species or local variety & not effect of breeding in & in, like our pidgeons).

The male of every animal certainly seems chiefly to impress the young most with its form & disposition |

89 Saw there young duck, like each other, — (& not very like either either . . . or Pintail ducks) from which they were descended they . . . from 1/2 pintail drake into pintail. — of them there were four two like each other & two dark coloured & different. — the former were the parents of the little ones |

90 Same man crossed Jackal & dog (offspring did not go to teat but parts swelled, though no fluid came from them. — showing how gradually every change is effected) — the one in the garden is from father dog & hence general appearance of face & tail somewhat like dog — though it has full share of Jackal shape |

101 of white speckles on elbow joint — in Bewick drawing[21] the the rock Pidgeon has not: now how many wild pidgeon have *spangles* on this part: this will be well worth working out. —

Study Temmincks[22] work on Pidgeons, & see whether feathered legs, — car[r]uncles on beak as in Muscovy duck, crested feather, pouters, fan tails, are found in any *colours* of plumage &c &c. Pouting pidgeon exaggeration of cooing. — & compare them with all the varieties. — Habits of rock pidgeon. — (I suspect *Pennant*[23] has described them) — (Study horns of wild cattle. — & plumage of fowls — *long* ears of rabbits. — & long fur. — feathers on legs of Ptarmigan & in Bantam. —) In the Pidgeons trace the washing out of the forked band, like in plumage of ducks. — |

102 Mr. Yarrell says in very close species of birds, habits when well watched always very different. — the two redpoles can hardly be told apart, so that after differences were pointed out Selby confounded them, yet can readily be told by incubation & other peculiarities. — (Mem. Goulds Willow Wren.) — (Goulds story of Water-Wagtails mistaken both species scattered over Europe) — The habits of some same North American & European birds slightly different — Barn Owl in the former place breeds in thick vegetation in swamps — owing to barn, perhaps not being left open to them. — In singing birds, part instinctive & part acquired — thus Yarrell has Lark & Nightingale which both sing their own songs though imperfectly. — Male birds always *record* their songs, it |

105 In Scandinavia besides the Rakkehan before mentioned between Capercailzie &

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[20] See "Darwin's Fourth Notebook on Transmutation of Species", *Bull. Brit. Mus.* (*Nat. Hist.*) Historical Series, vol. 2, 1960, p. 173, footnote 1.

[21] *Ann. Mag. Nat. Hist.*, vol. 2, 1838, p. 174.

[22] Coenraad Jacob Temminck, *Histoire naturelle générale des pigeons*, ..., ...,

[23] Thomas Pennant, *Genera of Birds*, Edinburgh, 1773.

Black Cock. — the latter has crossed with the Ptarmigan *subalpina* in wild state. — Neilson[24] has given figure of it. — In England no doubt the cross between Pheasant & Black game is owing to their rarity, as single female in wood with Pheasants would sure to be trod & in many parts of Scandinavia these birds are very far from common. — Under this predicament, probably, alone would species cross in wild state. — Is English red Grouse a cross between Black game & the *subalpina* of Sweden, (which in summer dress somewhat resembles Red Grouse) it may be so — but very improb-
106 ably, for it can hardly be | thought that the cross would have adapted it to changing circumstances. — More probably during known changes climate became unfit for *subalpina*, or some northern species, & being restricted species has been made. —

In the hybrid grouse between Black Cock & Ptarmigan (probably *subalpina*) former has blue breast, latter reddish, hybrid purple — *be careful.* See to hybrids between Pheasant & Black Cock & other hybrids.

The fact of Egyptian animals not having changed is good — I scarcely hesitate to say that if there had been considerable change, it would have been greater puzzle, than none, for the enormous time |

133 Lyells Elements.[25] p. 290 Dr Beck on numerical proportion in shells in Arctic Ocean. p. 350 Grallae in Wealden oldest birds. p. 411 Decapod Crust in Muschelkalk & 5 genera of reptiles. — p. 417 Magnesian Limestone & Zechstein oldest rocks in which reptiles have been found. p. 426. Sauroid fish in coal. true fish & not intermediate between fish & reptile — yet osteology closely resembles reptiles. p. 432 some plants in coal supposed to be intermediate between coniferous trees & Lycopodium. — p. 437 Many existing genera of shells in the mountain limestone (how different from plants!) But the Cephalopoda depart more widely from living
134 forms. — p. 458 Upper Silurian fishes oldest formation highly organized. — | do. p. 461 Lower Silurian — several existing genera — Nautilus, Turbo, buccinum, turritella, terebratula, orbicula, with many extinct forms & Trilobites.

Sept. 25th In considering infertility of hybrids inter se. the first cross generally brothers & sisters & therefore somewhat unfavourable. —

28th We ought to be far from wondering of changes in numbers of species, from small changes in nature of locality. Even the energetic language of Decandolle does not convey the warring of the species as inference from Malthus. — increase of brutes must be prevented solely by positive checks, excepting that famine may stop desire. — in nature production does not increase, whilst no check prevail, but the positive check of famine & consequently death. I do not doubt every one till he thinks deeply has assumed that increase of animals exactly proportionate to the number that can live. — . .

135 Population is increase at geometrical ratio in FAR SHORTER time than 25 years — yet until the one sentence[26] of Malthus no one clearly perceived the great check

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[24] Sven Nielson, *Ornithologia Svecica*, Hafniae, 1817–21.

[25] Sir Charles Lyell, *Elements of Geology*, London, 1838.

[26] This note, written on 28 September 1838, makes it possible to identify the sentence in T. R. Malthus's *Essay on the Principle of Population* which enabled Darwin to see how the pressure of natural selection is inevitably brought to bear. It was in the 6th edition, London 1826, vol. 1, p. 6: "It may safely be pronounced, therefore, that the population, when unchecked, goes on doubling itself every twenty five years, or increases in a geometrical ratio".

amongst men. — there is spring, like food used for other purposes as wheat for making brandy. — Even a *few* years plenty, makes population in man increase & an *ordinary* crop causes a dearth. take Europe on an average every species must have same number killed year with year by hawks, by cold &c. — even one species of hawk decreasing in number must affect instantaneously all the rest. — The final cause of all this wedging, must be to sort out proper structure, & adapt it to changes. — to do that for form, which Malthus shows is the final effect (by means however of volition) of this populousness on the energy of man. One may say there is a force like a hundred thousand wedges trying [to] force every kind of adapted structure into the gaps in the oeconomy of nature. or rather forming gaps by thrusting out weaker ones. — |

136 D'Orbigny[27] Comtes Rendus p. 569. 1838 says the cross between the Guaranis & Spaniards are almost white from first generation, that with Quichuas the American character is more tenacious & does not disappear for many generations.

Sept 29th Dr Andrew Smith. Remarks on extraordinary curiosity of Monkeys. The Baboon of which anecdotes have been told is Cynocephalus porcarius. — This monkey did not like a great coat made for it at first, but in two or three days learn its comfort & though could not put it *on*, yet threw it over |

151 The present age is the one for large Cetacea, as the past for other Mammalia, & still further back reptilia & Cephalopoda.

Old Jones[28] remarked to me that one of the children of Sir J.H. was so like Sir W. whilst Sir J. is himself not like — now this is a clear case of avitism. but then? was not the expression of Sir W. itself received from his father so that case ceases to be true avitism

Annals of Natural History[29] p. 135 Natural History of the Caspian Fresh water Fish !! ?adapted to Salt Water? — peculiar species. crabs & molluscs few. — ?are not some same — what is the alliance with the Black Sea. — it would be ocean. what is land to continent — Original Paper worth studying. Archiv fur Naturgeschichte.[30] |

152 September 11 *Generation* Mr. Yarrell says it is well known that in breeding very pure South Down that the ewe must never be put to any other breed else all the lambs will deteriorate. — Lord Moreton's[31] case —

When cows have twins, though capable of producing both pair of male & female. — if there be one female, she will be free Martin.[32] See Hunter's Owen —

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[27] Alcide Dessalines D'Orbigny, " L'Homme américain (de l'Amérique méridionale), considéré sous ses rapports physiologiques et moraux ", *Comptes Rendus Acad. Sci. Paris* tome 7, 1838, p. 569.

[28] Unidentified.

[29] *Ann. Mag. Nat. Hist.*, vol. 2, 1838, Bibliographical Notices, p. 135, refers to subject of following footnote.

[30] E. Eichwald, Einige Bemerkungen über das kaspische Meer ", *Archiv. für Naturgeschichte*, 4ter Jahrgung, Bd. 1, pp. 97–112, ... ; on p. 97 : " Wenn gleich die grösste Zahl der Fische des Meeres Flussfische sind, die jedoch als solche nicht an den Mündungen der grösseren Flüsse, also da, wo das Seewasser süss ist, leben, so finden sich dennoch mehrere Arten, und zwar aus Gattungen, die bisher nur im salzigen Seewasser beobachtet wurden ".

[31] cf. " Darwin's First Notebook on Transmutation of Species ", *Bull. Brit. Mus.* (*Nat. Hist.*) Historical Series, vol. 2, 1960, p. 63, footnote 7.

[32] John Hunter, *Observations on certain parts of the Animal Oeconomy*, with notes by Richard Owen, London, 1837, p. 34, " Account of the Free-Martin ".

In the Athenaeum[33] Numbers 406, 407, 409 Quetelet papers are given & I think facts there mentioned about proportion of sexes, at birth & causes. |

159 they first appear occupy their *proper* positions, — this would be argument for development of either. — (Mammae or sheath of horses penis reduced to extreme degree of abortion). — Insecta. — hermaphrodite. being not only dimidiate, but quarter grown seems to show whole body imbued with possibility of becoming either sex. — In my theory I must allude to separation of sexes as very great difficulty, then give speculation to show that it is not overwhelming. —

Seeing in Gardens of Hybrids between common & Silver Pheasant, one like cock & other like hen — one doubts whether they are not Hermaphrodites, like J. Hunters Free Martin. N.B. the common mule must often have been dissected. |

160 Zoolog. Garden. Sept. 16. Hybrid between Silver & common Pheasant. Mule bird, said to be infertile. — spurs rather smaller than in silver male — Head like silver except in not having tuft. — back like do. — but the black lines on each feather instead of coming to point are more rounded. & much broader, & three I believe, instead of two lines, faintly edged with reddish brown — black marks on tail much broader. — Breast red like common pheasant — lower part of breast each feather is fine metallic green with tip & part of shaft metallic green. — This green doubtless is effect of metallic hue of silver pheasant. yet why green? & not purple? — leg pale coloured. — In the back feathers, we have character different from either parent bird — |

173 the manner in which frogs copulate & fish show how simply instinctive the feeling of other sex being present is — it also shows that semen must actually reach the ovum. — [Why in making a bud, which is to pass through all transformations should there need two organs ; whilst in common bud there is no such need. — one would suppose that the vital portion ?nerves? passed through transformation & was received into bud matured by female : such view no way explains Lord Moreton's case : without the nervous matter consists of infinite numbers of globules : generally sufficient for one birth or other] II. It should be observed that the constant necessity for change in process of generation applies only [to] the more complicated animals.

p. 310 She wolf took dog[34] but had such aversion to it, that she was held. Hunters Oeconomy. So with inter-breeding as told by Willis[35] |

174 v. infra p. 179 continued from

Is a flower bud produced by union of two common buds ??? Amongst buds each one exactly like its parents. all alike in one parent or tree, but not in other trees. — Why should there be a necessity that there should be something each time added to that kind of generation, which typifies the whole course of *change* from simplest form. — (Because by the process it separates those differences which are in harmony with all its previous changes, which mutilations are not). but why should it demand some further change? Man properly is hermaphrodite (hence monstrosities tend that way from frequency of this tendency all mammals must long have so existed with double union.[)] — At present I can only say the whole object being to acquire differences, indifferently of what kind, either progressive improvement or deter[ioration] . . that object failing, generation fails. — How completely *circumstances* alone make changes or species !! The view of each man or mammalia being abortive hermaphrodite simplifies case much ; & originally each hermaphrodite being simple (are not coniferous trees generally dioecious oldest forms) |

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[33] Adolphe Quételet, " On Man and the Development of his Faculties, &c. " *Athenaeum*, nos. 406 407, 409, 1835 ; pp. 593–5, 611–3, 658–61 ; on p. 611 : " an examination of births registered in France during a lapse of fourteen years, that the average number of male births to female was 106·38 to 100 . . . he proceeds to inquire into the external circumstances by which these proportions may be partially affected ; . . . that the number of male births is relatively less predominant in cities than in agricultural districts ".

[34] John Hunter, *op. cit.*, p. 323 : " she would not allow any dog to come near her . . . She was held, however, while a greyhound dog lined her ".

[35] cf. " Darwin's Second Notebook on Transmutation of Species ", *Bull. Brit. Mus.* (*Nat. Hist.*) Historical Series, vol. 2, 1960, p. 110, footnote 4.

Pages excised from Fourth Notebook

IV

5 Those who have studied history of the world most closely & know the amount of change now in progress, will be the last to object to the theory on the score of small change — on the contrary islands separated with some animals &c. — If the change could be shown to be more rapid I should say then some link in our train of geological reasoning extremely faulty.

The difficulty of multiplying effects & to conceive the results with that clearness of conviction, absolutely necessary as the basal foundation stone of further inductive reasoning is immense.

It is curious that geology by giving proper ideas of these subjects should be *absolutely* necessary to arrive at right conclusion about species.

Changes of level &c. are easily recorded, but change of species not as — without
6 every animal preserved. the latter pages in the history are perfect, | we obtain a glimpse only of the changes which the government is subject to. — further back we obtain here & there in order a scattered page, we find sensible change in the institutions & we suppose not only revolutions, but certain obliterations & first laws created, & yet with symmetry & regular laws that baffles idea of revolution. —

My very theory requires each form to have lasted for its time: but we ought in same bed if very thick to find some change in upper & lower layers. Look at whole Glacial period — Good objection to my theory: a modern bed at present might be very thick & yet have same fossils. does not Lonsdale[1] know some case of change in entire series |

9 Study introduction to Cuviers[2] Règne Animal.

No structure will last without it is adaptation to *whole* life of animal, & not if it be solely to womb as in monster, or solely to childhood, or solely to manhood. — it will decrease & be driven outwards in the grand crush of population. —

Octob. 10th. Saw two undoubtedly rabbits in poulterer shops, of same colour as a Hare, but paler & buffer — with long ears & longer hind legs ??? — so that I was almost doubtful which it was. — do hind legs increase in any rabbits |

10 One may strongly suspect that breeding in & in, produces bad effects solely, because of similarity, because in every country, where only pair has been introduced, & have freely bred, they have not lost power of producing.

Williams Narrative of Miss. Enterprise[3] p. 497. Vampire bats abound in the Navigators & at Manguia, but are unknown eastward of the Navigators. Snakes occur there, but are unknown in Henry or Society isles. |

11 Hope[4] says positively he has seen a Calosoma (very like American form) in Stonesfield slate, & a Melolon . . . [?] In marl from Lake Constance species of European genera =. — Hope has idea about generic character dominant predominant &c. having relation to geographical distribution. — Thus Hattica is such genus. — because found in all quarters: his ideas not clear. In Australia some approach to

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[1] William Lonsdale.

[2] Georges Cuvier, *Le régne animal*, Paris 1817.

[3] John Williams, *Missionary enterprises in South Sea Islands*, London 1837.

[4] Frederick William Hope, personal communication.

Asiatic in part near Timor, & to European in Van Diemens land where there is close
species of elater — Where this collection is particularly rich as in Lucanidae less
difficulty in establishing good groups. — |
12 ears varying so much. — kind of fur (do tips of ears take any colour?) — length of
tail varies & character of fur — I am sure a very good case might be made out of
variation analogous to specific variations. —

Kerrs[5] Collect of Voyages Vol. 8 p. 46 Capt. Davis in 1598 found cattle in Table
Bay with Hump on their back & big-tailed sheep.

do. Vol. 10. p. 373 & 374 Spaniards say no Tortoises in the place besides Galapagos[6] |
13 do. 376. Isle Tres Marias off Mexico with small Hares & *raccoons* S. American
form — off province of Guadalaxura[7] —

October 11th. — Uncle John[8] says Decandolle[9] distributed seeds of Dahlia all
over Europe same year. — he sowed them for four generations before they broke. —
showing effects of cultivation gradually adding up. & four more generations before
they began to double. —
At present time Uncle J. does not suppose one aboriginal variety for they are all
14 made by fertilizing | one plant with another — Uncle John says he has no doubt
bees fertilize enormous number of plants — it is scarcely possible to purchase seeds
of any cabbage where a great many will not return to all sorts of varieties, which he
attributes to crossing. — Cape Broccoli can hardly be reared without greatest care be
taken to prevent fertilization from turnips & other stocks. Says if any variety of
apple be sown, all |
19 in the cats, the joints near the tip of the tail were generally crooked, as if they had
been broken". are born so in all Malay countries W. Earl.[10] Eastern Seas, p. 233.

Octob. 12. Kotzebues[11] Second Voyage Vol. II, p. 344. account of insects of
St Peter & St Paul in Lat 53° yet fauna like that 60° & 70° of Europe. — Many
European insects. list given — some peculiar —

do. p. 359. At Manilla a small Cercopithecus., & skins of Galiopithecus. —

Malte Brun[12] Vol. XII p. 133 at Samar SE of Luçon, many monkeys, buffaloes
&c &c — Malte Brun would be worth skimming over with regard to this archipelago |
20 Octob. 13th. — Kotzebues First Voyage[13] Vol. II p. 867. "The Fauna of the
Sunda islands presents us, for the most part, with the same families and genera,

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[5] Robert Kerr, *A General History and Collection of Voyages and Travels* . . . London, 1811–1824; vol. 8, p. 46: "Their cattle are large, and have a great lump of flesh on the shoulder, like the back of a camel. Their sheep have prodigiously large tails, entirely composed of fat, weighing twelve or fourteen pounds, but are covered with hair instead of wool".

[6] *ibid.*, vol. 10, p. 373: "The Spaniards say there are no others in these seas, except at the Galapagos, but they are common in Brazil".

[7] *ibid.*, vol. 10, p. 376: "The *Tres Marias*, or Three Marias, off the Western coast of Guadalaxara, in the kingdom of Mexico . . . There are also many excellent hares, but much smaller than ours. We saw likewise abundance of guanas and some racoons, which barked and snarled at us like dog".

[8] John Hensleigh Allen of Cresselly.

[9] Augustin Pyramus de Candolle.

[10] George Windsor Earl, *The Eastern Seas; or Voyages and Adventures in the Indian Archipelago in* 1832, 1833, and 1834, London, 1837; p. 233: "Here, as in all Maya countries I noticed a peculiarity in the cats, which I never heard satisfactorily accounted for. The joints near the tip of the tail are generally crooked, as if they had been broken".

[11] Otto von Kotzebue, *New Voyage round the World*, 1823–1826, London, 1830.

[12] Conrad Malte Brun, *Annales des voyages*, Paris, 1809–14.

[13] Otto von Kotzebue, *Voyage into the South Sea and Beering's Straits* 1815–1818, London 1821.

that are natives of S. Asia, but many of the *species* are peculiar to them ". do. p. 368 " Several kinds of animals have spread from the end of Borneo to the adjacent island — In Soolos we find the elephant — in Magindaneo several kinds of the large monkeys. — Fewer mammalia have passed to Paragua & in Luçon the most northern of the group the number is limited["] |

21 do. Vol. III p. 77 Kotzebues Second Voyage Many foreign plants have been introduced in Guahon (Mariannes), " for example the prickly *Limonia trifoliata*, which cannot now be checked ". — Marsden[14] p. 94 (1st Edit) of Sumatra has given account of Buffalo of the East which differs from that of S. Europe —

p. 189 The giant kind of crocodile sometimes wanders from Pellew to Eap [Yap] — There is another great Lizard, Kalug, which is found at Pellew & Eap, but not at Feis (near island) |

22 do. p. 190. The inhabitants of Summagi, a territory in the small isl^{d} of Eap in the Carolines are remarkably short. — & Deformations are particularly common. — without arms, hands, thumbs, — one leg, hare lip &c. &c. In Vol II p 363 account of Flora of Pacific. given in my coral paper.[15]

Oct. 14th. Macleay[16] says that any character even colour is *good* (i.e. invariable) in some classes. — it is because every part is under change, now one part now another — |

25 Octob. 19th. When reading l'Institut 1838 p. 329. Milne Edwards[17] description of curious mechanism of respiration or rather ventilation peculiar to some orders of crustacea, one is tempted to think that it must have been invented all at once. — but naturalists if they had series perfect, would expect this structure would become obscure & therefore it might then have arisen, & M. Edwards p. 330 distinctly states that the flipper is a mere simple modification of an organ present in whole class. |

26 Case of Mexican greyhounds. — young being habituated instance such as Hunter,[18] or some one mention of influence on parent affecting offspring. — & as *adaptation*. — however mysterious such is case. therefore chance & unfavourable conditions to parent may be become favourable to offspring: Australian dogs having mottled coloured puppies case of this. — tendency in manner of life to be mottled & hereditary *tendency* determines the puppies to be so. — |

35 ARGUMENT REAL of antiquity of reasonable cosmopolite man. l'Institut[19] 1838 p. 338. *Important account* of cross of sheep & Moufflon of Corsica, sadly against Yarrell's law. — not so much against my modification of it — Goat & Moufflon will not breed —

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[14] William Marsden, *History of Sumatra*, London, 1783.

[15] Darwin's paper on Coral Islands, written in 1835, has been published, with an introduction by D. R. Stoddart, by Pacific Science Board, National Academy of Sciences, Washington D.C., Atoll Research Bulletin No 88, 15 December 1962.

[16] William Sharp MacLeay, personal communication.

[17] Henri Milne-Edwards, *L'Institut*, tome 6, 1838, p. 329 : " un système de palettes qui fonctionnent à la manière des ventilateurs et opèrent le renouvellement de l'eau par appel, en rejetant sans cesse au dehors une portion du liquide contenu dans la cavité branchiale ".

[18] John Hunter, *Observations on certain parts of the Animal Oeconomy* with notes by Richard Owen, London, 1837.

[19] *L'Institut*, tome 6, 1838, p. 338. Zoologie : *Metis du Moufflon et du Mouton.* — " M. Flourens donne lecture d'une note de M. Marcel de Serres sur un métis provenu de l'accouplement du Moufflon et du Mouton . . ."

p. do — [20]Fish of Teneriffe. St. Helena & Ascension most species like & *identical* with S. America & many very *close.* See full paper A most grave source of doubt in distinguishing which parent impresses offspring most is whether mother has had any offspring before — now this is never stated. |

36 Regarding the similarity of offspring to Parent same laws appear to hold good with regard to marriage of individuals & varieties of same species & to different species — sometimes like one parent & sometimes other & sometimes 1/2 way. Ed. New Phil. Transact[21] Rabies common to men dogs horses cows pigs & sheep — disease common for men and animals cowpox — case in Spain of pustulous disease following handling sheep — all case do. p. 354 The most vicious dog will not attacke any animal except dog when absent |

41 *Vegetation* & conchology. — shells of Africa ought most to resemble fossil ones of Europe. Consider probable form of land. — S. America, an island, connects with Asia between two polar lands. — Africa not so *equatorial.* —

The fact of no Mam : Placent : insectivore being in S. America & Australia reason why Marsupiata when fresh introduced live & multiplied specifically & individually.—|

42 I see clearly from F.R.[22] it will be highly necessary to show that if species fall, genera must. Lesson[23] I remember says Mariana Deer very close to a Molucca species. —

L'Institut 1837, p. 253 on animals of Antilles.[24] (see Macleay[25] in Zoolog. Journal on those of Cuba. — It is important to understand well the relation of passage from N. to S. American forms.

The climate of N. America must have been *equable* & *far* more so than any other part of the World. — Europe perhaps less so than either Americas. — |

85 Decem. 21st L'Institut[26] 1838 p. 414 M. Eichwald has published Fauna of Caspian. — fishes fresh water kinds (yet living in the Salt ?) — very few animals of any kind — Fauna must be very curious — with respect to the non-development of Mollusca, which I have sometimes speculated might be owing to absolute quantity of vitality in the world : — *the production* of *vitality,* as argued by Müller from propagation of infinite numbers of individuals from one of adverse. — |

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[20] *L'Institut,* tome 6, 1838, p. 338. Géographie Zoologique : Poissons des îles Canaries. — " M. Valenciennes lit des considérations sur l'ichthyologie de l'Atlantique et en particulier sur celle des îles Canaries . . . "

[21] *Edinburgh New Philosophical Journal* vol. 24, 1838, p. 353 " Observations on Rabies or Madness in Dogs, Oxen, Horses, Pigs, and Sheep. by Dr. Wagner . . .

[22] Dr Sydney Smith suggests that Darwin intended to write " F.B. " meaning Sir John Richardson's *Fauna Boreali-Americana* . . ., London, 1829–1837.

[23] René Primevère Lesson, in Louis Isidore Duperrey, *Voyage autour du monde . . . sur la corvette La Coquille.* Zoologie, Paris, 1826–1830.

[24] P. Gervais, *L'Institut,* tome 6, 1838, p. 253 : " Zoologie : Mammifères . . . communique une note sur les animaux mammifères des Antilles ".

[25] William Sharp MacLeay, " Notes on Capromys ", *Zool. Journ.* vol. 4, 1829, p. 269 ; *cf.* " Remarks on the Comparative anatomy of certain birds in Cuba ", *Trans. Linn. Soc. Lond.*, 16, 1833, p. 1.

[26] L'Institut, tome 6, 1838, p. 412 *Chronique*
" — Un travail de M. Eichwald récemment publié sur la faune de la mer Caspienne a donné à ce savant l'occasion de combattre l'opinion que la mer Caspienne aurait été primitivement unie à la mer Noire. Il se fonde dans cette conclusion sur la différence qui résulte de la comparaison des faunes des deux mers. Le plus grand nombre des Poissons de la Caspienne sont des Poissons d'eau douce. Cette mer est de la plus grande pauvreté en animaux marins, surtout quand on la compare à la mer Noire. Et cependant, dit M. Eichwald[1] si les deux mers avaient été autrefois en communication, on ne devrait trouver dans l'une aucune espèce qui ne fût également dans l'autre ".

86 Decemb. 25th Lyell says the elevated shells in Bayfields district are much more like those of Scandinavia than of the N. American species — Dr Beck says the shells in Scandinavia from height of 200 & 300 ft. are identically same as those of present seas. — now in this country we have better means of judging the *slowness* of physical changes, than in any other. & yet 200–300 ft. no elevation & no change & even no loss of species. |

87 It must never be overlooked that the chronology of geology rests upon amount of physical change & only secondarily, by assumption well grounded, on time; — therefore the mere loss of species, which may be the works of a few years as with the Lamantin of Steller[26A] tells much less though it also the effect of change, than a slow gradation in form which must be effect of slow change & therefore precludes effects of catastrophes, which must serve to confound our chronology. CONSIDER ALL THIS. — Extinction & transmutation, two foundations, hitherto confounded, of geology. — |

88 L'Institut 1838. p. 414 M. Guyon[27] thinks monsters more common in Africa than in Europe especially with Europeans settled there.

L'Institut do. p. 419. long account of Hyaenodon, a fossil dog leading towards Hyaena.[28] — See Comte Rendu. — I suspect good case of fossil filling up blank. — not between existing series of species of dog & Hyaena. — but a common point. whence both may have descended. — |

91 continent. in like manner as Madagascar does to otherside of Africa. — (Juan Fernandez to Chile??) Falklands to southern portion. Annals of Nat. Hist.[29] 1838 — do p. 269 on fresh water fish peculiar to Ireland.[30] do. p. 283. on the dark ears of the wild Chillingham cattle,[31] with reference to Mr. Bell's[32] statement of the tame ones, — an instance of a trifling peculiarity not to be eradicated. — do. p. 305. — Mr. Owen[33] says in abstract in his paper on the Dugong, "The generative organs being those which are most remotely related to the habits & food of an animal, I have always regarded as affording very clear indication of its true affinities. We are least likely in the modifications of these organs to mistake a merely *adaptive* to an *essential* character" — How little *clear* meaning has this to what it might have. — |

92 What is the difference between an *essential* character & an *adaptive* one. — are not the essential ones eminently adaptive. — Does it not mean *lately* adapted or trans-

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[26A] Stellers Sea-cow.

[27] M. Guyon, *L'Institut*, tome 6, 1838, p. 414: Tératologie, "en Afrique les monstruosités sont plus communes qu'en Europe".

[28] M. Laizer & M. Parieu, *L'Institut*, tome 6, 1838, p. 419; Paléontologie: Mammifère inconnu . . . "Description et détermination d'une machoire appartenant à un Mammifère jusqu'à présent inconnu . . . Hyaenodon".

[29] Edward Forbes, *Annals of Natural History*, vol. 2, 1838, p. 250: "On the Land and Freshwater Mollusca of Algiers and Bougia".

[30] William Thompson, *Annals of Natural History*, vol. 2, 1838, p. 269: "On Fishes; containing a notice of one Species new to the British, and of others to the Irish Fauna" (Salmo ferox, Lake Trout, in Lough Neagh, *cf. Proc. Zool. Soc.* 1835, p. 81.)

[31] L. Hindmarsh, *Annals of Natural History*, vol. 2, 1838, p. 274, "On the Wild Cattle of Chillingham Park"; on p. 283: "in the colour of the ears there is a trifling difference, but this appears to be an occasional variety in the species".

[32] Thomas Bell, *History of British Quadrupeds*, London, 1837.

[33] Richard Owen, *Annals of Natural History*, vol. 2, 1838, p. 305, reference to *Proceedings of the Zoological Society*, 27 March 1838, containing this statement.

formed & hence not indicative of true affinity. — Owen[34] says Dugong connected with Pachydermata. — p. 306. the Dugong cannot be united with true Cetacea or whales.[35] — but an aquatic Pachyderm & Walrus — aquatic seal — (Consult this passage when considering origin of Northern Cetacea). — do p. 318 M. Pictet[36] of writing of Goethe, alludes to difference between fossil & recent Bull : like fossil & recent shells of the new raised beaches.—who maintains that |

103 Sr C Bell[37] has some account of wolf in Zoolog. Gardens which brought its puppies to be fondled. — and we see in the Australian dog an instance of a half reclaimed animal.— the dogs, which have been wild here, have done so in hot countries. One ought to be able to hybridise the camel. Camel does not vary like ass & horse in lesser degree, how different to dog! (Hybrids of Calceolaria.) Same way some plants vary more than others : Does the Power of easily making tolerably fertile hybrids bear relation to capability of Variation? my theory says so. |

104 March 6th. Mr Bentham[38] says in Sandwich Isld. he believes there are many cases of genera peculiar to the group having species peculiar to the separate islands. In his work on the Labiatae some of these species are described. — capital case. — for Sandwich Isld^s are very similar to Galapagos — study Flora. what general forms. — are the Labiatae nearest to American or Indian groups? Believe some Mediterranean, but chiefly *mountainous* — this is very important (Sicily exception) see if this can be generalized—isld^s have peculiar |

Rhododendron ferrugineum begins at 1600 metres precisely & stops at 2600 & yet
115 know that plant can be cultivated with ease near London — what makes the line,
as of trees in Beagle Channel — it is not elements! — We cannot believe in such a
line. it is other plants. — a broad border of killed trees would form fringe — but
there is a contest & a grain of sand turns the balance. — M. Ramond p. 19 do.
(Hort. Transact. Vol I)[39] says lofty Alpine plant of Pyrenees agree with those of
Norway, Lapland, & Greenland. but not | with those of Kamtchatka, Siberia, or
116 even of polar regions of N. America. — if true curious on my view — because these
points were last connected with those northern regions.[40] do. p. 21 says many

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[34] Richard Owen, *ibid.*, p. 307 : " I conclude, therefore, that the Dugong and its congeners must either form a group apart, or be joined as in the classification of M. de Blainville, with the Pachyderm ".

[35] Richard Owen, *ibid.*, p. 306 : " Now we have seen . . . the junction of the Dugongs and Manatees with the true Whales cannot therefore be admitted in a distribution of animals according to their organization ".

[36] M. F. G. Pictet, " On the writings of Goethe relative to Natural History ", *Annals of Natural History*, vol. 2, 1839, pp. 313–322 ; on p. 321 : " his observations on the researches of Dr Jaeger upon the subject of fossil bulls found in the neighbourhood of Stuttgart. Goethe seeks to prove in this article, that the difference which exists between fossil and recent bulls may be looked upon as the result of the perfecting of the species during the centuries which separate the two periods ".

[37] Sir Charles Bell, *Anatomy and Philosophy of Expression*, London, 1806.

[38] George Bentham, *Labiatarum genera et species*, London, 1832–6.

[39] *Transactions of the Horticultural Society of London*, 1820 (3rd ed.) Appendix IV, p. 15 " On the Vegetation of high Mountains, translated from a Paper of M. Ramond's in the *Annales du Muséum*, vol. 4, p. 395." By Richard Anthony Salisbury . . ." On p. 19 ". . . Norway, Lapland, and Greenland, furnish plants analogous to those of the Swiss Alps and Pyrenees, but few, or possibly none of them, are seen in Siberia, Kamschatka, or even in the polar regions of America. . . . "

[40] *ibid* p. 21 " . . . . grow wild in the same place, and follow the same route. The *Anthericum Bicolorum* of Algiers, traverses the same chain of mountains, and arrives in Anjou. The *Scilla Umbellata* and *Crocus Mudiflorus*, have migrated from the Pyrenees even into England. Yet not one of the above mentioned vegetables has been disseminated laterally, to meet those southern ones which have crossed the Swiss Alps. . . . "

plants skirt each side of the great N & S valleys, which penetrate Pyrenees in branch valleys — M. Ramond offers no explanation.

119 Examine list of St Helena Plants & see whether those which grow in low ground are those, which are common & nearest being common to other parts of the world. —

March 16th Mr. Lonsdale showed me two specimens of an Inoceramus from the Gault of Folkestone, which is exactly intermediate between *I. concentricus* & *I. sulcatus.* — the beak of this one has concentric striae, all the lower part rayed longi-
120 tudinally (give woodcut) like *I. sulcatus.* — Both species are | found at Folkestone. — it is unnamed this intermediate one. — Mr. Lonsdale evidently inclines to think it *Hybrid* !!! Ask Woodward[41]

Mr. Lonsdale says *Trigonia costata* & *elongata* though considerably different in proportional dimensions must be considered merely varieties & even Mr. Sowerby is coming to this conclusion, from specimens in grades, now L. says that *T. costatus* |
121 is in England found in the Inferior Oolite, & the *T. elongata* in the Upper formation Portland Stones &c. &c. — if so it is good case : — In Sowerby[42] Min. Conch. it is however, said they have been found *together* in coast of France. — L. doubts. — Lonsdale thinks Ammonites would afford instance of such facts. — Ask Phillips.[43] — |

122 The more I think, the more convinced I am, that *extinction* plays greater part than *transmutation.* — Do species *migrate* & *die* out? —

March 20th. Phillips in Lecture in Royal Institution says shells become less in number (?species or individuals) the deeper one goes — surely is this true? — most strange. — In the place where any species is most common, we need not look for change, because its numbers show it is perfectly adapted ; if where few stray ones are that change may be anticipated, & thus fresh creation. the gardener separates a plant he wishes to vary — domesticated animals tend to vary. |

123 Does not spermatic animalcule in Mosses render my view of the crossing of mosses & all others by action of wind difficult. —

Cline on the breeding of animals.[44] p. 8. size of foetus in proportion to male parent. p. 8. his whole doctrine of the advantage of crossing consists in the idea of the male being smaller, & the female larger than the average size : (surely this is very limited view though perhaps a true element) give examples : pigs with small chinese boar &c. &c. &c. Offspring take more after father than mother ; illustrated by the crossing of hornless sheep with horned. — compare this with what highland shepherd said. — |

124 p. 12. Attempts to improve the native animals of any country must be made with great caution ; owing to its adaptation to the surrounding circumstances. According to my theory no *land* animal with *fluid* seeds can be true hermaphrodite. —

Man probably assumes the hairy character of his forefathers only when advanced in age, & therefore the children do not (& in hairless kittens we see same fact) go

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[41] Samuel Pickworth Woodward (1821–1865) was 18 years old in 1839 which shows that this pencil note was added at a date later than that at which the Notebook was written.

[42] James Sowerby, *Mineral Conchology of Great Britain*, London, 1812–46.

[43] John Phillips, author of *A Treatise on Geology. Lardner's Cabinet Cyclopaedia*, London 1837.

[44] Henry Cline, *Observations on the Breeding and Form of Domestic Animals*, London, 1829.

125 back, & this is argument against Blyth's[45] | doctrine of young birds retrogressing —
Uncovering the canine teeth or sneering, has no more relation to our present
wants or structure, than the muscles of the ears to our hearing powers.

E.[46] frowns prodigiously when drinking very cold water, frowns connected with
pain as well as intense thought. —

No one but a practised geologist can really comprehend how old the world is, as
the measurements refer not to revolutions of the sun & our lives, but to period
necessary to form heaps of pebbles &c. &c. : the succession of organisms tells nothing
about length of time, only order of succession. |

126 Splendid Pamphlet (published in Philosoph. Journal April 1st 1839) by Sedgwick
& Murchison[47] ; which is a beautiful instance of *forms*, intercalated between two great
distinct formations. — particulars are given p. 246–248 & 258.

A beautiful case showing the gradation from one grand system to another : in
each system, the changes from limestone to san[d]stone &c. show some great change
who can say how many centuries elapsed between each of these gaps. far more probably
than than during the deposition of the beds. — The argument must |

129 April 3d. — Henslow[48] tells me following facts : believes that only red Lychnis
grows in Wales & certainly only white in Cambridge. in some counties sometimes
one & sometimes other. — there is some difference of habit between these varieties,
so that they have been thought to be different species. Lychnis dioica, generally
dioecious yet parts only very slightly abortive & bed of female flowers will sometimes
produce a few seeds. — Ruscus aculeatus a dioecious plant, in which the male plant
130 sometimes | bears female flowers, the organ. are most clearly abortive, so that they
become so by suppression of one organ. here language forces on us the change, which
seems to have taken place. — Almost all Dioecious & monoecious plants have rudimentary
abortive organs, even more so Polygamia : Monoecia & Dioecia, preeminently
artificial, so that even some species only in genera have this structure. —

Some willow trees have been observed to change their sex. — this effect from
age, what Mr. Knight[49] |

139 then dropped it & was found alive. Stanleys Familiar History of Birds[50] — several
cases on record of stoats being carried (p. 121) & dropped having wounded the bird.
p. 124 — Mr. Willoughby[51] found a dead lamb & hare by the side of Eagles nest,
which shows power of carrying great weight p. 125. is said that Eagles bring rabbits

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[45] Edward Blyth, *Annals and Magazine of Natural History*, vol. 9, 1836, p. 402 : " Every modification of every successive type is thus rudimentally different from the most approximate modifications of every other equivalent type, or superior type, to which it does not appertain ; and this is the same conclusion to which I have been irresistibly led from consideration of various phenomena connected with the change in plumage which takes place in birds. As every species is perfectly and essentially different from every other species, so, except in a retrograde direction, are the successive typical and subtypical plans upon which they are severally organised ".

[46] Erasmus Alvey Darwin, Darwin's elder brother.

[47] Adam Sedgwick & Roderick Murchison, " Classification of the Older Stratified Rocks of Devonshire and Cornwall ", *Philosoph. Mag.* vol. 14, 1839, pp. 241–260.

[48] John Stevens Henslow.

[49] Thomas Andrew Knight.

[50] Edward Stanley, *Familiar History of Birds*, London 1838.

[51] Francis Willughby. In the 1854 edition of Edward Stanley's *Familiar History of Birds* " . . . Mr. Willoughby. an excellent authority, mentions a nest which he saw in the woodlands, near the river Derwent, in the Peak of Derbyshire, some 150 years ago. . . . and by them a lamb and a hare, and three heath-poults. . . . "

& hares to the young ones to exercise them in killing them. " Sometimes it seems
hares, rabbits, rats & not being sufficiently weakened by wounds get off from the
young ones while they were amusing themselves with them and one day a rabbit
140 escaped into a hole, where | the old Eagle could not find it. — The parent bird another
day brought to her young ones the cub of a fox which after it had fought well &
desperately bitten the young ones would in all probability have escaped " — if it
had not been shot by a shepherd who was watching the scene. — In Shiart Isl^{d} it is
said, that an Eagle always procured its prey from another island. —

p. 175. 28 short eared owls were counted in a field where there was great swarm
of mice. — |

165 May 29th. — Henslow says that he has not the slightest doubt that Festuca vivapara
is the same species with *F. ovina* & was rendered vivaparous by growing in
height. — yet he has seen it propagated in a garden, which is case precisely analogous
to the Canada onion mentioned in Hort. Transact. *Aisa caespitosa* become vivaparous
on mountain & yet can be raised in gardens. — Poa alpina, though generally
vivaparous sometimes seeds. There are endless curious facts about every part of
plant producing buds, so that Turpin[52] says each cell of plant is individual. — Most
plants which propagate rapidly by buds, layers &c. &c. do not seed freely. — The
periwinkle seldom produces seeds, because it is thought to require insects to impregnate
it. — it is allied to Asclepia, where this is always the case according to Brown. — |

166 Voyage of Adventure & Beagle.[53] Vol. I. p. 306 *Shells* as well as plants of Juan
Fernandez differ from American coast. Vol. II p. 251 about the drifting of
animals on ice — p. 643 — very curious table of all the castes from Stephenson at
Lima.

The same numerical relation (both in species and subgenera) between the Crag
& Touraine beds, the one with neighbouring & Arctic sea, & the other with neighbouring
& Senegal in sea — is remarkable. — Again the resemblance between the Superga
167 & Paris, numerically | the same with recent & yet almost wholly different, is same,
as if Isthmus of Panama. — Those two cases highly improbable — yet I can see
no other way of accounting for them. — Think over this — The Superga beds have
many shells in common with Touraine & are not far distant, which as L. says is
strong argument for their contemporariness. — How is this with the Eocene beds. —
see Lyells[54] tables —

Bennetts Wanderings[55] Vol. II p. 155. By inference I imagine that there are
Baboons in St. Thomas on W. coast of Africa. |

168 Owen[56] Linn. Soc. April 2d 1839. The Lepidosiren. — Amblyrhyncus & Toxodon,
all equally aberrant — the two former connecting classes like Toxodon in orders. —
Fish & reptiles in former case — Reptiles & Birds & Mamm. in Amblyrhynchus — is
not this right? —

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[52] Pierre-Jean-François Turpin, *Organographie microscopique des végétaux. Sur l'origine du tissu cellulaire*, Paris, 1829.

[53] Robert FitzRoy, *Narrative of Voyages of H.M.S. Adventure and Beagle*, London, 1839.

[54] Sir Charles Lyell, *Principles of Geology*, vol. 3, London, 1833, Table II, pp. 389–393.

[55] George Bennett, *Wanderings in New South Wales*, London, 1834.

[56] Richard Owen, " Description of the *Lepidosiren annectens* ", *Trans. Linn. Soc. London*, vol. 18. 1841, p. 327 ; read 2 April 1839.

June 18th. Eyton[57] tells me that Yarrell[58] knows of a Gull which has laid in domestication eggs of two shapes & colour — Eyton has observed same thing in
169 *Brent Goose* | Eyton says some of the pidgeons in common Dovecot are very like a Himalaya species — *leuconotes.* —

Magazine of Nat. History 1839 p. 106. Waterhouse[59] refers to fossil remains of the Hamster. — is not this Siberian animal? —

Eyton[60] says that the young of two hatches all alike between the male Chinese & female common goose took after the common goose thus contradicting (probably) Yarrells[61] law & Walkers[62] of the male giving form — they interbred & the young kept constant & all alike |

170 Waterhouse says some of the Galapagos Heteromera . . . [?] must come very near to Patagonian species. —

p. 18 of Temmincks[63] Preliminary discourse to Fauna of Japan. — that the animals of islands N. of Timor are allied to the type of genera in isles de Sonda as well by those which are identical, as those which are different — now this is same as Galapagos facts &c. &c. — & it shows the cause which gives same species to different isl^{d}. is the same as that which gives genera. — now in case of large |

173 Mr. Greenough[64] on his map of the world has written Mastodon found at Timor — thinks he has seen specimen in Paris Museum. —

Athenaeum 1839 p. 451. Sheep Merinos from Cape of Good Hope have different constitution from those of Europe[65] — for they stand India better than the latter. —

Forrest Voyage[66] p. 323. Sooloo imported elephant. wild hogs — spotted deer. no loories, but cocatores & small green parrots. |

174 June 26th — Yarrell: — Black Swan in domestication & nature strictly monogamous — geese polygamous (?when wild) but even some birds are so when wild — wild ducks monogamous; tame ones highly polygamous — change of instinct by domestication. —

"Notices of the Indian Archipelago" Published at Singapore in 1837. by Mr. J. H. Moore. — p. 1 Elephant Rhinoceros Leopard (but not Royal Tiger) &c. are found but only in one part the northern peninsula of Borneo. — Ox & hog natives of Borneo. |

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[57] Thomas Campbell Eyton.

[58] William Yarrell.

[59] George Robert Waterhouse, "Observations on the Rodentia", *Magazine of Natural History*, vol. 3, 1839, p. 106.

[60] Thomas Campbell Eyton, "Some remarks upon the Theory of Hybridity", *Magazine of Natural History*, vol. 1, 1837, p. 357.

[61] See "Darwin's Fourth Notebook on Transmutation of Species", *Bull. Brit. Mus.* (*Nat. Hist*)., Historical Series, vol. 2, 1960, p. 173, footnote 1.

[62] Alexander Walker, *Intermarriage*, London, 1838.

[63] Coenraad Jacob Temminck, "Aperçu général . . . sur les Mammifères qui habitent le Japon . . .", in P. F. von Siebold, *Fauna Japonica*, Leiden, 1833.

[64] George Bellas Greenough.

[65] *Athenaeum*, 1839, p. 451: "Asiatic Society . . . Agricultural and Horticultural Society of Bombay, in reply to a request for information respecting the breeds of cattle used in the Presidency. . . . Sheep are rare . . . Experiments are now making to improve the breed. . . . The merino from the Cape is found to answer much better than that brought from England".

[66] Thomas Forrest, *A Voyage to New Guinea, and the Moluccas, from Balmabangan*, London 1779; p. 323: "At Sooloo are none of those beautiful birds called Loories; but there is an abundance of diminutive cocatores, and small green parrots . . . Here are wild elephants, the offspring, doubtless, of those sent in former days from the continent of India, as presents to the kings of Sooloo . . . Sooloo has spotted deer".

175 Notices of Indian Arch. Singapore 1837 by J.H. ? J. H. Moore do p. 189, 190.
No full sized horse is found East of y Bussamporter & S. of Tropic — after quitting
Bengal the fact is noticed in Cassay Ava Pegue seldom equal 13 hands — those of
Lao & Siam inferior to those of Pegu — in Sumatra they breed both small — Java
pony occasionally reaches 13 hands. — Phililppine Pony somewhat resembles that
of Celebes is somewhat larger than the Sambawa Java & Sumatra breeds. (Here it
appears there are shades of difference in all the isl^{d}. like in wild animals). — There are
prevailing colours in the different islands. — The horse is only found wild in the
plains of Celebes. (but language shows that probably not original there) — shows them
isl^{d} not fit for horse. Forrest[67] (p. 270) says many wild horses, bullocks, & deer
176 South part of Mindanao. — | do. Appendix p. 43, 45. the *Breed* of elephants in little
isl^{d} of Sooloo. — said to have been imported : shows they will propagate get dimensions. — do. App. p. 73 State of Muar in Malacca — speaks of Rhinoceros as well as
Tapir. —

Journal of Asiatic Soc. Vol. V. p. 565 in a paper by Lieut. Newbold.[68] — A Malayan
albino described "To this day the tomb of his grandfather, who was also an albino
is held sacred by the credulous natives, & vow made at it. Both his parents were
of the usual colour. His sister is an albino like himself said not to be common" —
probably, I should think grandfather first of race & if so, fact for my theory |
181 that throughout the *Moluccas* Archipelago they are only to be found on the isl^{d}
of Batchian near S.E. end of Gilolo.

Forrest Voyage[69] p. 39[70] — deer but no wild animals in Gilolo. — p. 134[71] Birds
of Paradise were first produced from Gilolo. — p. 253[72] In isl^{d} of Bunwoot (18
miles in circum) there are hogs and monkey near shore of Magindano |
182 Vol. do p. 634[73] alludes to the fact stated by M. Tournal that skulls found near
Vienna approximate to Nigro forms ; those from Rhine to the Caribs. — Vol. II
p. 650[74] Long attested account of fall of fish in India. — Windsor Earl. Eastern
Seas p. 229[75]. Believes the Tapir found in Borneo p. 233[76]. There as well as all Malay
countries the cats are born with the joint near the tip crooked. — is this form |

[67] Thomas Forrest, *ibid.*, p. 270 : "Here are many wild horses, bullocks and deer".

[68] J. T. Newbold, "Sketch of the State of Muar", *Journ. Asiatic Soc.*, vol. 5, 1836, pp. 561–7.

[69] Thomas Forrest. "A Voyage to New Guinea and the Moluccas, from Balamangan . . . London, 1779.

[70] *ibid* on p. 39 ". . . The island Gilolo abounds with bullocks and buffalos, goats and deer, also wild hogs, there are but few sheep, and no wild beasts. . . ."

[71] *ibid* on p. 134 ". . . the Portuguese first found these birds on the island of Gilolo, the Papua Islands, and on New Guinea ; and where they are known by the name of passaros da sol, i.e. birds of the sun . . ."

[72] *ibid* on p. 253 . . . Saw a number of wild hogs . . ."

[73] *Journal of the Asiatic Society* vol. 2, Calcutta 1833. "Occurrence of the Bones of Man in the Fossil State" by J[ames] P[rinsep] p. 634 ". . . M. Tournal and other French naturalists, further suppose that several races of men have successively had possession of our continents. The form of the skulls found at Vienna is stated to approach to the African or Negro type. Those discovered in the fluviatile marls of the valley of the Rhine and Danube exhibit a close resemblance to the heads of the Karibs of those of the ancient inhabitants of Peru and Chili. . . ."

[74] *ibid* p. 650 Miscellaneous : "5. — Fall of Fish from the Sky".

[75] George Windsor Earl. "The Eastern Seas, or Voyages and Adventures in the Indian Archipelago, in 1832–33–34 . . ." London, 1837. On p. 229 ". . . and an animal, which, from the description given, must have been a *tapir*. . . ."

[76] *ibid.* p. 233 ". . . Here, as in all Malay countries, I noticed a peculiarity in the cats, which I never heard satisfactorily accounted for. The joints near the tip of the tail are generally crooked, as if they had been broken. I was at first inclined to doubt that they were born thus, but was afterwards convinced that such was the case. . . ."

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Pp. 177–189; 1 Text-figure

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

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By R. B. FREEMAN

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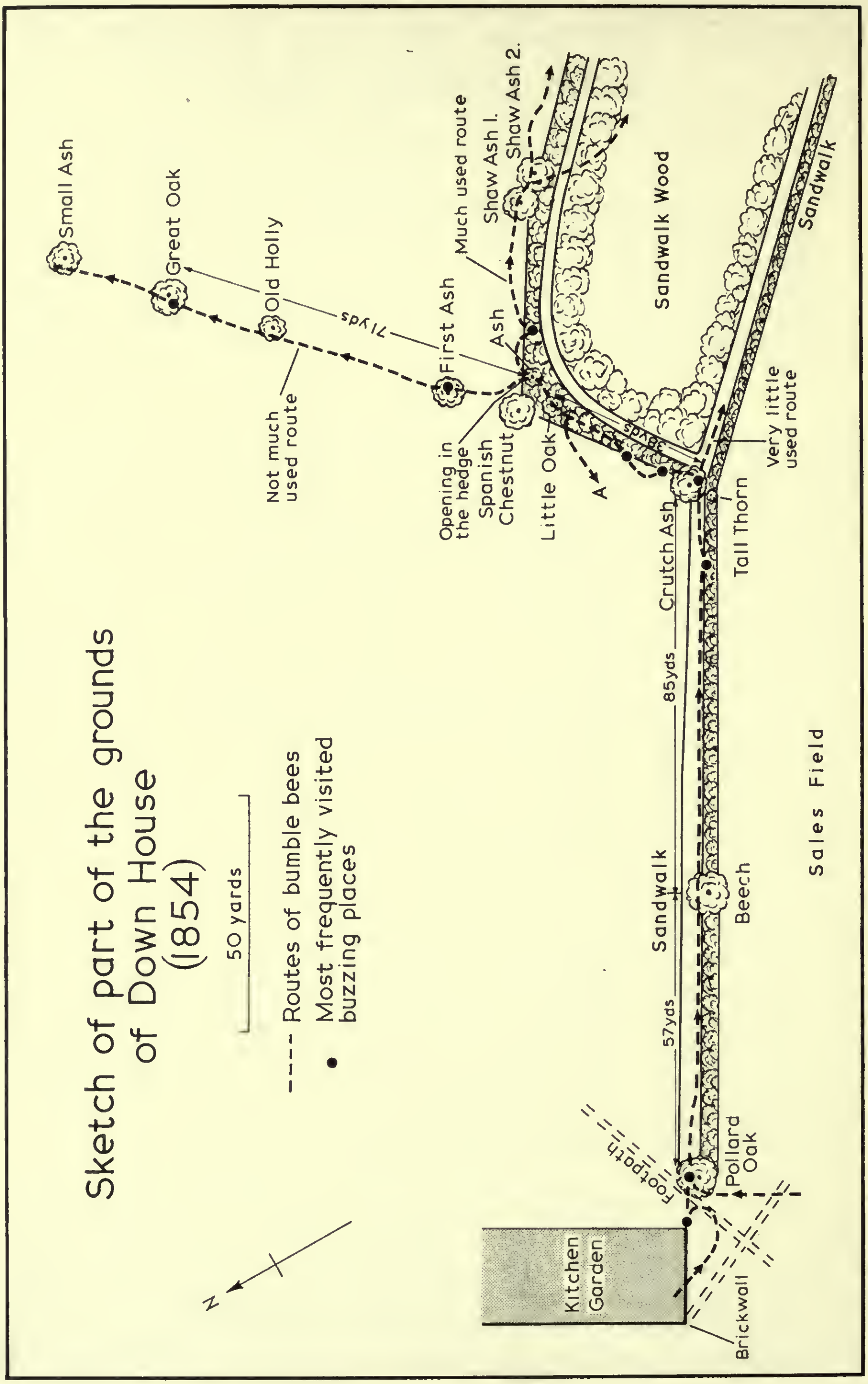
1. INTRODUCTION

BETWEEN the years 1854 and 1861 Charles Darwin, with the help of five or six of his children, made a number of observations on the flight routes of male humble bees. These he recorded at the time in a series of field notes, but he never wrote them up for publication in England. In May 1872, however, he wrote a précis of them. It is these notes and a version of the précis which are printed below.

A German translation of this précis was published in 1886 by Ernst Krause in the second volume of his edition of some of Darwin's shorter works entitled *Gesammelte kleinere Schriften*, 1884–86. Krause describes, in a footnote, here translated from the German, how he came by the manuscript: " The present essay by Darwin was amongst the papers of Professor Hermann Müller of Lippstadt, the authority on the relationships between flowers and insects, who died on 25 August, 1883. It was sent to him in May, 1872. I have mentioned this in my biography of Müller where further details may be found. So far as I know it has never been published, but the observations that it contains are far too valuable to be forgotten. I owe this information to the son of my late friend, Dr. Hermann Müller, who is a secondary school master in Liegnitz ".

Darwin's original must have been written in English, because he had little German, and it must have been accompanied by a sketch of the relevant parts of his grounds at Down House, because a plan with German captions accompanies the translation. I have not been able to trace the whereabouts of the original manuscripts, either in English or in German. This précis was translated from the German into English and published, with the German plan, in my *Works of Charles Darwin*, 1965. The version published here is somewhat modified in the light of the words actually used by Darwin in his notes, and it also contains a few corrections.

The existence of Darwin's original field notes was brought to my attention by Mr. P. J. Gautrey of the Department of Western Manuscripts, University Library, Cambridge. They are written in ink on nineteen leaves of blue-tinted paper and on one, dated August 13th, 1861, of a much darker blue. The outside wrapper is of the same blue-tinted paper and bears on the front " Humble Bees / Cupboard IX / C3, 10 [10 is deleted] / For Letters"; and on the back " (Humble Bees) ". There is a rough pencil sketch of the grounds on the inside of this wrapper. They


Sketch of part of the grounds of Down House (1854)
50 yards
---- Routes of bumble bees
● Most frequently visited buzzing places
N
Small Ash
Great Oak
Old Holly
71yds
Not much used route
First Ash
Ash
Opening in the hedge
Spanish Chestnut
Little Oak
A
Much used route
Shaw Ash I.
Shaw Ash 2.
Sandwalk Wood
Sandwalk
38yds
Very little used route
Tall Thorn
Crutch Ash
85yds
Sandwalk
57yds
Beech
Sales Field
Pollard Oak
Footpath
Kitchen Garden
Brickwall

are amongst a collection of Darwin manuscripts which were deposited in the Library by Sir Robin Darwin in 1963.

It is clear that they were set down shortly after the times of each original set of observations. There are no indications that they were altered or added to later, except for the addition of the general title on the outside cover, and possibly the addition of years, in pencil, at the top of some leaves. The notes are written in a condensed manner with many contractions and inconsistencies of usage. In the transcript given below I have expanded the contractions and straightened the inconsistencies. For example, Darwin wrote buz or buzz, sand-walk, sandwalk or swalk; I have used buzz and sand-walk throughout. I have not attempted to expand the condensations. In most places the sense is clear, and where it is not, a hypothetical expansion would be no aid to comprehension. In general, the notes are legible, but I am doubtful of the readings of a few words; these I have placed in brackets [ ] which Darwin uses only once. A line by line transcript without expansions has been deposited with the manuscript at Cambridge.

Neither of the two British books devoted to the humble bees, those of Sladen (1912) and of Free & Butler (1959), mentions Darwin's work, although the latter devotes several pages to the flight paths, as they are now called, of the males. A considerable amount of research on this subject has been undertaken in recent years which has confirmed and extended Darwin's observations, but his own work is not usually referred to, nor is his name mentioned. The best paper is that of Arthur Frank (1941) in which he describes closely similar flight paths for males of *Bombus hypnorum* and *Bombus terrestris*, but he is apparently unaware that accurate observations on the subject had been made nearly ninety years earlier. Haas (1952) has explained one of Darwin's difficulties by showing that the males mark their buzzing places with secretions from the mandibular glands, which attract others to the spot. Darwin's comment, in the field notes, about the dog and the corner stones shows that he had considered such an idea, but he does not mention it in the précis. The only paper that I have seen which refers to Darwin's work is one by Krüger (1951) which gives an excellent summary of his findings as they are given in the précis.

2. PRÉCIS

On September 8th, 1854, one of my sons[1] saw some humble bees enter a hole at the base of a tall ash tree. I looked into this hole hoping to find the entrance to a nest, but was unable to see one. Whilst I was examining the hole, another humble bee entered it, and, after flying off, returned almost immediately and, flying upwards for about a yard, flew away through a crutch between two large branches of the ash.

I now removed all the grass and other plants which were growing around the hole, but still could not find any entrance. After a minute or two, another humble bee appeared. It buzzed over the area that I had cleared and then flew up and passed, like the previous one, through the same crutch. I watched many others behaving in the same way, all coming from the same direction and arriving at intervals of a few minutes. The only exception was that some flew round the stem of the large ash instead of through the crutch. I was later able to confirm that all these bees were males of *Bombus hortorum.* I made similar observations on many other occasions, and was able to follow the bees from the ash to a bare spot at the side of a ditch where they buzzed again, and then for several yards further to an ivy leaf where the procedure was repeated. I am going to call these spots where they stopped for a few seconds " buzzing places ". From the ivy leaf they went into a dry ditch which was covered over by a thick hedge and flew slowly along the ground between the dense branches of thorn. I could only follow them along this ditch by making several of my children[1] crawl in, and lie on their tummies, but in this way I was able to track the bees for about twenty-five yards. They always came out of the ditch by the same opening, but from here there were three routes leading in different directions which I have indicated on the plan by dotted lines. I have marked them as far as I was able to follow the bees. There were several buzzing places on each of these routes, always a few yards apart. One of these was very odd because the bees had to fly down several feet to a fallen leaf at the bottom of a very thick hedge, and then fly back again by the way that they had come.

I then followed their route for about a hundred and fifty yards until they came to a tall ash, and all along this line they buzzed at various fixed spots. At the far end, near a pollard oak, the track divided into two as shown in the plan. On some days all the bees flew in the direction I have described, but on others some arrived from the opposite direction. From observations made on favourable days, I think that the majority of individuals must fly in a wide circle. They stop every now and then to suck at flowers. I confirmed that whilst in flight they move at about ten miles an hour, but they lose a considerable amount of time at the buzzing places. The routes remain the same for a considerable time, and the buzzing places are fixed within an inch. I was able to prove this by stationing five or six of my children each close to a buzzing place, and telling the one farthest away to shout out " here is a bee " as soon as one was buzzing around. The others followed this up, so that the same cry of " here is a bee " was passed on from child to child without interruption until the bees reached the buzzing place where I myself was standing.

After a few days the routes were slightly changed. The bees first buzzed at the base of a tall slender thorn in a hedge opposite the tall ash; they then flew slowly upwards close to the trunk of the thorn, and, ascending to a considerable height, crossed over a big branch of the ash where they buzzed, and were lost to view as they flew high over it. I saw scores of bees flying upwards by this particular thorn, but never saw one come down again. I kept up these observations for several years from the middle of July until the end of September. The best time for observation is the middle of a warm day.

Now I must describe the strangest part of the whole business. For several successive years male bees followed almost the same routes, and several of the buzzing places were exactly the same, for instance in the hole at the foot of the tall ash; furthermore the bees always flew away through the same crutch. They also travelled along the same dry ditches and flew in or out through the same small opening at the end of the hedge, although there were many similar openings at this spot which could have served their purpose just as well.

In the first year I saw dozens of bees coming through this particular opening and flying along the bottom of the ditch to the tall ash. But in the second year the bees visited the thorn mentioned above and flew upwards from there, and in the third they visited a different thorn nearby. At first I was astonished by these facts, and could not understand how bees born in different years could apparently learn exactly the same habits. But they seem to prefer to fly along hedges and paths, and they love to buzz around the feet of trees, so that I assume that the same routes and the same buzzing places have some kind of attraction for this species; but I am unable to understand in what this attraction consists. At many of their buzzing places there is nothing particular of note. When one of them has been frequently visited, it is possible to change its appearance completely without interrupting the visits. For instance I pulled up all the grass and plants from the one at the foot of the ash and sprinkled white flour on the spot, without this making any change in the visits. It is just as difficult to understand how individual males from the same nests in the same area follow the same routes and buzz in the same places in one particular year as it is to understand how the bees follow the same routes and choose the same buzzing places year after year; for I believe that they emerge one after another, and I have never seen two travelling together. I have also been unable to understand the purpose of this habit of always flying along the same routes and buzzing at the same places, thereby losing a great deal of time. I have kept a look out for queens on these flight paths, but have never seen one.

The males of *Bombus pratorum* also have buzzing places and behave in many respects like those of *Bombus hortorum*, but their habits and routes are somewhat different. On a visit to Devonshire I was able to confirm that males of *Bombus lucorum* visit buzzing places in the same way.

Mr. F. Smith[8] of the British Museum knew nothing of this habit, but he referred me to a short note by Colonel Newman in the *Transactions of the Entomological Society of London* (New Series, Volume 1, part 6, 1851, p. 67). I have always regretted that I did not mark the bees by attaching bits of cotton wool or eiderdown to them with rubber, because this would have made it much easier to follow their paths.

3. FIELD NOTES

Sept. 8th—13th 1854. George[1] observed numerous humble-bees (I think all same species) go and buzz at spot at foot of ash. I cleared away all leaves and rubbish, feeling sure there was a nest—but none—this clearing made no difference. Then observed that bees mostly went through great fork of ash, or round bole, and buzzed at a spot on bole; then flew along side hedge and ditch and buzzed at (3/ bare ground, then along ditch to ivy leaves 4/, then along deepish dry ditch, lined by ivy and full of thorns (so go by only slowly) and out by round hole in hedge at end by (5/spanish chesnut[2]. I think sometimes though rarely went straight along outside ditch.—One day all travelled in this course, other days a good many came travelling in back direction, but I think never so many.—Hoop-net which placed on (3/ buzz place, did not prevent bees coming and so caught. So not guided by vision—Prudent bee flew away but afterwards returned.—

At buzz 5, there seems branching off. Some go obliquely across field towards flower garden: others to great ash, 5(a) but very many of these first went up hedge to south (probably to buzz 6.) and then returned in a △. From ash 5a I *think* they go to great oak—but most from hole in hedge by spanish chesnut (5/ do not buzz there but go [?about] south along hedge, to dead leaf in hedge (6/, this buzzing place singular as it lies rather in rubbish of hedge and bees have to fly in and out a good way out of course. From 6. they go a little along hedge and then over it to 6(a) or still further to between two ash branches (7 into the shaw. Here those that have gone over by 6a join same route. I have seen several fly from 6 to 5.—Here the bees come [?into] generally fly to near ground. Some buzz about and then go back out of shaw and apparently on southward, but others (I saw 3) go through thickest part of shaw obliquely into the sand-walk by seat on old fir.—These buzzing places must cause *extreme* delay. Do not come in afternoon 4–5. I have observed only 12–1½. Come at about 1 per minute to buzz (1.

Sept. 14 Stormy. 12¾ oclock. Think bees flying about, but not one watched for ¼ hour on to track. At last they came quite quick in reverse course from buzz 2 to a new buzz (–1 Frank[1]), deep in ditch, (just as if going into a hole) then down almost straight for 20 yards sand-walk; but Etty[1] says that some went towards kitchen garden. Others came from –1 to 2 and thence *towards* 2, 3, etc.

Sept. 15th 1854. Have quite deserted buzz 1. Now go back and forward from –1 Franky[1] buzz—to 2, and thence direct without calling at spanish chesnut, (5) thence some to ash and some round corner to 6 etc. —. From –1 a few went to sand-walk, but most along hedge, calling at buzzing places every few yards to big beech, thence with many calls to pollard oak, thence over kitchen garden wall into Sales[3] field.—Buzz 2. being quite white with flower[4] made no difference in the calls when dusted at 2 always went direct to 5 then back to all calling places to the kitchen garden.—at 3½ none.

Sept. 17th Things go as usual at –1 Frank[1] buzz going in 3 ways thence, but some went through hedge. Observed there a different species buzzed all along straight hedge of sand-walk, at shorter intervals and never on ground, and very uncertainly at each buzzing place. But certainly they have numerous buzzing stages.—

Sept. 25th Much cold weather but saw some bees go to buzzing places at pollard oak by kitchen garden.—The other humbles by straight sand-walk quite active.—

Sept. 29th Very fine day. Several bees out, all visited Backy's[1] buzzing place, then went up either side of the thorn bush, then crossed over head to great limb of ash, and so up the limb, half up tree to where lost to view.

Oct. 2nd. Saw bees going up thorn and crossing over with greatest precision to one spot of great limb.—never have seen one come in reversed direction, but all from kitchen garden along walk.

Footnote: v. Trans. Entomolog. Soc. (New S.) Vol. 1 Part 6th. p. 87. 1851.[5]

July 23rd, 1855. George[1] and Franky[1] observed yesterday and 2 or 3 days ago several humble bees at buzzing places.—This day I saw them going to identical spot under crutch, where they were first seen last year.—Some now go round and towards spanish chesnut tree. Others go along walk, buzzing every now and then:

they buzz in hole on south side of great beech, instead of on north side, and at almost identical spot, if not very identical spot, on old oak pollard.—Bees went both ways. Willy[1] is almost sure that one bee stopped at flower and then went on course.—Several of the bees seemed only slightly to pause over the beech buzzing places; and some seemed to have difficulty in finding their buzzing places.

July 24th. After rainy morning watching at oak pollard 3 first bees came from west.—Ascertained some stop to visit flowers on road.—3 bees at intervals came from ash pollard to oak pollard, and buzzed in rather different way from others, which go on visiting some leaves and flying about and then turned and went back, visiting the buzzing places on walk-side and going back to big beech. Surely it is too early and too many for all these bees to be mere promenaders.—
4′ 50″ Bees yet visiting pollard oak. They do *suck* flowers on road.—

July 25th at 10.30 am. Bees at oak pollard. Often suck flowers on road. Seems almost general rule. At oak pollard at least 2 roads diverge.—I saw 2 bees enter hole by spanish chesnut (where hurdle was put), and fly along ditch; I think do not come out on other side of hedge.—It is impossible the bees could have hit accidentally 2 years successively on so obscure a hole: describe how long we were before we could find out this hole.

July 28th. Saw 5 bees enter hole by spanish chesnut; one or two entered 18 [?inches, word omitted] above hole. Also saw them at crutch.—

July 29th 11¾ am. Watched hole by spanish chesnut and saw during 1½ hours from 40–50 bees enter, and not one come out of hole. The greater number went (as by plan) from field ash to foot of *little ash* and then through hole to *base* up little oak, then up oak and then *east* of little ash (making circle and then by a very long flight to shaw ash 1 & 2.—I saw some crawl through hedge by little ash, so as to cut off circle and yet come back and go through proper route. Some few of them instead of going as described turned to west and flew apparently towards crutch ash.—

Again some thought by Willy[1] to be larger and more buzzing bees, came along ditch from south to foot of ditch oak and then turned to west and apparently flew back towards crutch ash. At crutch ash (having no effect) some go along well west to great beech etc.—often into sand-walk, and others round tree up towards spanish chesnut, apparently turning into ditch.—

Note at left of page: Bees flew in longest range from spanish chesnut hole and shaw ash 1 in 6½ seconds, a little over 10 miles an hour.

Aug, 17th Splendid day 12½ to 1 oclock. Watched for 20′ and saw not one bee enter hole by spanish chesnut.—but saw 3 enter hedge about 3 yards south of spanish chesnut turn by *A*, in reverse course to that formerly marked by Willy[1].—Ash. Watched crutch and cob-web shows quite given up that place. In fact very few bees about. ?Has one set died and another not yet born.—

Aug. 22nd. Saw 3 bees at crutch B. 2 flew towards spanish chesnut and one along walk.—From spider's web I do not believe any have buzzed before here.—1 looked large and bright yellow.—Saw queen visiting teazle flower.

Aug. 23rd. Saw bees at crutch, and they went *through* crutch, and towards spanish chesnut tree, entering by last year's ivy leaf buzz, but did not come out by hole by spanish chesnut tree. One or two went up young thorn south of thorn of last year.—

Aug. 29th Saw bees *several* go to exact spot at bottom of thorn (last years Franky[1] buzzing place); but not up the tree. Thence most went round ash to near or about old ivy. Buzzed and then turned through hedge at bottom to some sand, and then apparently along hedge bottom—Some, however, went to crutch buzz. All then came from kitchen garden way. Two bees after going to Franky[1] went about 4 feet back towards kitchen garden, buzzed and again came to Franky buzz. Now there are scores of trees like Franky[1] buzz. It certainly appears they keep to same buzzing places though course altered.

Sept. 7th. Saw bee at crutch buzz.

Sept. 26. Fine day: saw several bees at crutch: some went through: none called at thorn.—also saw 2 or 3 go into hole within one foot of old hole by spanish chesnut: some also buzzed at foot of spanish chesnut at old place.

Sept. 27th. Many at crutch. Called at marked place on *south* side of great beech, and at old buzzing place on old oak pollard.—

1856. July 10th. I several times watched before this date and saw none. Observed bees coming out of 2 or 3 [This is male of Bombus pratorum][6] near holes at end of hedge in sand-walk by ash and crossing walk buzzing a little about hedge to left of a hole in hedge, then fly into hole and then flying along bottom of hedge westward. Today (11th) saw one coming opposite course. 12th saw another coming opposite course. Also today 11th saw Bombus hortorum at bottom of Franky's[1] thorn: came in there and then flew *towards* big beech.—one other crossed towards old ivy-leaf buzzing place.—12th Saw both species, as before.—

July 25th. Saw B. hortorum go to tree-foot, next to Franky's[1] thorn, then fly along walk to south side of big beech tree.—one from this place went to surface of old ash, 18 inches from old buzzing place, then round towards old ivy leaf and then I believe to bottom of hedge near hole by spanish chesnut tree. I saw two go into the very old hole (and one by hole within foot's distance) by the spanish chesnut tree: I suspect come out near crutch buzzing place. One buzzed at oak by garden and then came to Franky[1] buzzing place and then towards spanish chesnut. Some went into sand-walk from new crutch place.—

July 26th. Saw bee go ivy-ash and then to Franky[1] buzz and then along sand-walk to beech. Saw many go from Franky[1] buzz towards spanish chesnut tree, and some called at ground buzzing place about yard from hole. One turned back at this buzzing place and went into the hole.

Note at left of page: How on earth do bees coming separately out of nest discover same place, is it like dogs at corner-stones?

Several called at buzz within yard of hole, coming from along the hedge running eastward, and went in to holes and then buzzed at foot of same young *ash* as last year and then went along bottom of hedge.—Lenny[1] thinks two kinds call at Franky[1] buzz, coming from big beech, and all go up, *towards* spanish chesnut, but only a few, *the larger* ones, come to the ground buzzing place within yard of hole: I am inclined to believe true.—I have as yet seen bees only go *into* hole.

July 30th. Saw several go to Backy's[1] thorn, then buzz about 18 inches to east, then go to west side of old ash, then to the east side where covered by ivy and then round corner into sand-walk.

Aug. 2nd. Saw bee go to seek old crutch buzzing place.—

1857. Aug. 28th. After having several times casually watched, saw bees at old used crutch buzzing place, after going into hollow, they flew a little up to right hand to some ivy leaves, and then straight down walk towards summer house.

Sept. 16th. Saw 2 bees go to thorn by the old ash: they went not to root, but low down, and then went high up where I lost sight of them.

Sept. 17th saw several on same thorn—one flew up towards branch of big ash tree, as [?anciently]—the rest just flew round big ash, towards corner with spanish chesnut.—I saw what I *fancied* was female come and find with difficulty the tree: and it rested on twigs and seemed to sting them.

Note at left of page: Do not females find males by their buzzing places? Several females and not nearly so many males as with hive bee.

1858. I watched many days and saw none until Leny[1] saw one on Sept. 14. To-day (15th) I also saw them at old identical crutch spot; several then flew first round gate to another little hollow at foot of tree: and some flew through the crutch and then went up towards spanish chesnut; but it did not come out of hole by spanish chesnut tree.

1859.—Aug. 12th. *Very* few humble bees—saw few buzzing at tall thorn, (not former one) but close within iron-hurdle within sand-walk—they apparently flew up the ash tree. They began buzzing high up the thorn.—

Aug. 18th & 19th. The bees now buzz in old thorn trees, as during former years; but they do not begin at base, but 3 or 4 foot up and then go up to top and so up to big ash.—N.B. I never saw bees go *down* thorn trees or come back through crutch, so must be to certain extent a *circuit*:

Aug. 24th. Today bees visiting old place in numbers under ash-crutch; but they buzz a few inches higher above weedy ground.—they go and come after buzzing by 3 routes (1) from sand-walk. (2) after buzzing they just go round tree, as formerly, and rebuzz and go along walk to kitchen garden. (3) they come from latter course, buzz, and then instead of flying through crutch, they take new line and go into hedge close on N.E. side of ash, and apparently go along hedge, but I could not see any coming out at hole by spanish chesnut.—A few got buzzing up thorn tree—I now think same liking of same place causes similarity on successive years.—

Aug. 13th. 1861. Torquay. *B. lucorum.* Saw *humble bees* different from Down species many buzzing repeatedly [deleted] at same spot a foot or two up stem of Pinaster on edge of walk—went round tree and buzzed longer than old species. Three times I saw bees alight on several leaves and stem of tree and apparently examine them closely—from this tree, they fly in 2 courses along the walk, and high up to another Pinaster above. I *fancy* I saw large female buzzing in this tree.—They always come from one way—I have now seen them for a full week, many buzzing—After about a fortnight they changed and gave up this tree.

Humble bees. Sept. 9th 1861. I have watched occasionally during last fortnight. The original spot at foot of crutch almost deserted—I have watched whilst many bees have gone to neighbouring places many times and have seen only one go to base of crutch and through the crutch—some come out of hole of hedge on sand-walk side of old ash and many buzz at the thorn tree which they used to go up and on both trees near. There are many buzzes.

At hole in hedge by spanish chesnut on west side there is ivy covered thorn at which very many buzz this is new.—several came along bottom of hedge, but instead of coming out by hole by hurdle, they turn within the shaw and buzz at foot of little ash close by and then at another ivy ash close by.—I am convinced the bees instinct may lead them to same sort of places.—Journal of Horticulture or Cottage Gardener 1861 Oct. 22 p. 76[7] on humble bees fertilized on ground or on flowers or coming out of nest—does not favour idea of buzzing connected with marriage.—F. Smith[8] has seen them in union on flowers.

4. NOTES

1. The five children that Darwin refers to were: 1. Willy (William Erasmus b. 27th December, 1839), 2. Etty (Henrietta b. 25th September, 1843), 3. Georgy (George Howard b. 9th July, 1845), 4. Frank, Franky, Backy (Francis b. 16th August, 1848), and 5. Lenny, Leny (Leonard b. 13th May, 1850). Elizabeth, known as Bessy, (b. 8th July, 1847) may also have taken part but is not mentioned by name. The field notes show that the son mentioned in the first line of the précis was George.

2. Chesnut is spelt consistently without a middle t.

3. Sydney Sales owned land adjoining Darwin's. He is mentioned in correspondence between Leonard Darwin and solicitors in 1881, preserved in the University Library, Cambridge.

4. Spelt " flower " in the manuscript, but flour is clearly intended.

5. Newman, H. W. Habits of the Bombinatrices. *Proc. ent. Soc. Lond.* Meeting of 2nd June, 1851, pp. 86–94. On page 91, in a general comment on the males of all species Newman states " and each of the males of all the species making a round of visits in fine weather, in the early part of the day, to particular spots, and each species varies its flight in this respect, on the ground, in a manner that a little resembles the workers "; and on page 92 of *B. muscorum* " The male of this species . . . may be distinguished by his low flight along hedge-rows, and his stopping frequently as if intending to go into the ground; this he will continue for a mile together, and if watched, he will be seen to return to the same place more than ten times in an hour."

6. The brackets are Darwin's.

7. Newman, H. W. Is the female Bombus fertilized in the air?. *J. Hort. & Cottage Gardener*, 1861, October 22, pp. 76–77. A query by Darwin and reply by Col. Newman that copulation occurs on the ground, on flowers, and in the nest; and that pairs may fly *in cop.* but do not start copulation there.

8. Frederick Smith, the hymenopterist on the staff of the British Museum. The original German of the Précis refers to him as J. Smith, in error.

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I am grateful to Sir Robin Darwin and to the Librarian of the University Library, Cambridge for permission to publish the field notes. I am also grateful to Mr. P. J. Gautrey, not only for bringing the manuscript to my notice, but also for comparing my transcript against the original and reading several difficult words. Lady Barlow and Lady Keynes have both been most kind in trying to find out which of Darwin's children was sometimes known as Backy, and in giving me their recollections of the sand-walk in the nineties. Lady Keynes identified him in a letter from Darwin to George (her father) written in 1868, as Francis.

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NATURAL HIST

THE REEVES COLLECTION
OF
CHINESE FISH DRAWINGS

P. J. P. WHITEHEAD

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
HISTORICAL SERIES Vol. 3 No. 7
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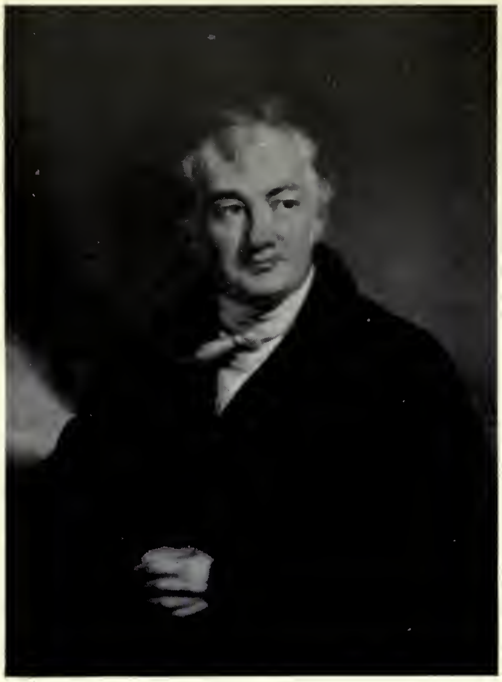
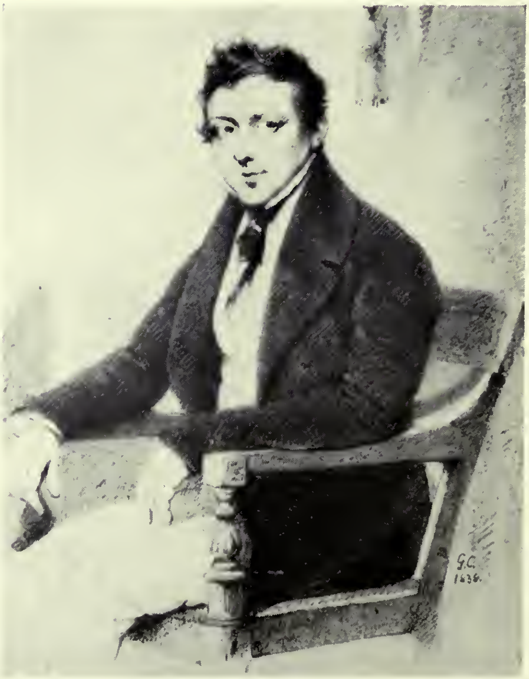

Oils, ? by G. Chinnery

John Reeves
(1774-1856)

John Russell Reeves
(1804-77)



Pencil, G. Chinnery, 1838

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BY

P. J. P. WHITEHEAD

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THE REEVES COLLECTION OF CHINESE FISH DRAWINGS

By P. J. P. WHITEHEAD

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INTRODUCTION

Among the many original water-colour and pencil drawings in the Zoological Library of the British Museum (Natural History) is a collection of nearly five hundred water-colours of fishes by Chinese artists, dating from 1828–30. This is the Reeves Collection, of which the library has two further hand-made copies. Only a few of the Reeves drawings of fishes have ever been reproduced, and apparently never in colour, but they hold great importance to ichthyology because of their use, not only in colour descriptions of known species, but also as the basis for descriptions of new species. No less than eighty-three drawings have been used as the *sole* basis for species descriptions, and these drawings must be considered iconotypes.

All the iconotypes are reproduced here (twenty in colour) except for nine already published (see list, p. 204) and two that could not be located (No. 27 and No. 274 as listed here). The drawings were examined by many leading ichthyologists of the last century, but were principally used by Sir John Richardson in his work on Chinese and Japanese fishes. Günther distrusted drawings as the basis for description, listing many of Richardson's new species as doubtful, but too many nomenclatural problems exist for the Reeves drawings to be ignored.

The Reeves fish drawings represent only a portion of the work commissioned by this energetic man, for there are also volumes on plants, insects, birds, mammals, crustaceans and molluscs, mostly in the British Museum (Natural History). For conceiving this huge enterprise, and for the evident labour required to supervise it and to maintain such a high standard, John Reeves deserves great credit. Although he lived at a time when such projects were not uncommon, the Reeves Collection of drawings must rank among the best of that age, both for accuracy and artistic merit, as well as for sheer quantity.

JOHN REEVES AND HIS SON J. R. REEVES

During the late eighteenth and early nineteenth centuries, when a knowledge of natural history was considered part of a liberal education, many enthusiastic Englishmen made collections and supervised drawings of the animals and plants seen during voyages or in the course of their employment in India or the Far East. The Honourable East India Company, realizing that more exact botanical knowledge could bring economic returns, began at the turn of the century actively to support such studies. As early as 1803 the Company asked its Factory at Canton for Chinese pictures of plants and miscellaneous subjects (Archer, 1962). Thus, when John Reeves arrived in Canton as Assistant Tea Inspector in 1812, there was already something of a tradition encouraged by the Company itself.

John Reeves (1774–1856) became one of the foremost collectors of natural history specimens in southern China in the early nineteenth century and was mourned as "among the Nestors of Horticulture" in an obituary notice (*Gardener's Chronicle*, 1856 : 212). His contributions to English horticulture, and to the Horticultural Society of London in particular, were indeed immense. Through him came the first shipments of Chinese azaleas, camellias, paeonies, chrysanthemums and roses, as well as hundreds of dried plant specimens and paintings of Chinese plants. Not a Company's ship at that time sailed for Europe without her decks being decorated with little portable greenhouses containing new horticultural treasures. The collection of Chinese animal paintings compiled by John Reeves was yet another notable contribution to knowledge of the natural history of China.

He was the youngest son of the Rev. Jonathan Reeves of West Ham. Left an orphan at an early age, he received his education at Christ's Hospital and afterwards entered the counting house of a tea broker. By 1808 he had acquired such a thorough knowledge of teas that he was recommended to the office of Inspector of Tea in England for the Honourable East India Company. In 1812 he was sent out to China as Assistant and later Chief Inspector of Tea at Canton. He worked in Canton during the tea season, but at other times resided at Macao. His duties do not appear to have been very arduous and he seems to have been able to devote much of his time to the investigation of many aspects of Chinese culture and natural history. He returned finally to England in 1831, having served three tours in China (of about five years each), broken by two periods of leave (1816–? and 1824–6). His first impressions of China do not seem to have been very favourable (. . . *we have been disputing for months past with the villainous Government of this vile Country* . . . he wrote to his sister in 1814), but this did not last and one is impressed with his evident enthusiasm for everything Chinese. Through his son (see below) he maintained close links with China after his retirement. With the signing of the Treaty of Nanking, the ports of Canton, Amoy, Foochow, Ningpo and Shanghai were thrown open to foreign trade and residence. Eager to take advantage of the opportunities this afforded, Reeves formed a Chinese Committee on whose recommendation the Royal Horticultural Society sent the outstanding plant collector Robert Fortune to China in 1843. An account of the great contributions that Reeves made to horticulture and some short notes on his life were given by Bretschneider (1898 : 256–

263), derived principally from the *Chinese Repository* and from obituary notices in the *Gardener's Chronicle* (1856) and the *J. Linn. Soc. London* (1856 : xliii).

One of Reeves' correspondents was Sir Joseph Banks, and he seems to have shared with Banks an avid curiosity about everything he encountered. There are twelve letters (1812–21, the final ones written after Banks' death) written to Banks in the list compiled by Dawson (1958) and they deal with such topics as a method for making sheet lead into thin leaves, the composition of Chinese ink, a Chinese preparation for the treatment and preservation of fishing nets, the technique for staining horn for coloured lamps, inlaid lacquer-making methods, and so on, together with notes on plants. To Lady Banks he sent packages of tea, and to Sir Joseph plants and such curiosities as an edible bird's nest (on the composition of which he had definite views—see below, p. 201).

Reeves' publications include a short paper on the *materia medica* employed by the Chinese (*Trans. Med. Bot. Soc.*, 1828 : 24–27), and his compilations and Chinese names for stars and plants published by John Williams in Robert Morrison's *Dictionary* (parts 2 and 3).* His descriptions of a comet observed in May 1820 appeared in the *Indo-Chinese Gleaner* (1820 : 436) under the name of Collas. He seems to have been a competent naturalist, but made no collections for himself and let others publish his findings. Tribute to him and to his son was paid by botanists and zoologists in the naming of new genera and species. The name *reevesii* was bestowed twenty-seven times on species of mammals, reptiles, birds, molluscs and fishes (eight fishes, named by Richardson, Gray and Valenciennes). In 1817 Reeves became a Fellow of the Royal Society and of the Linnean Society and he must have been in close touch with leading naturalists of the day.

Reeves' notebooks (see below, p. 199) give no date earlier than 1828 for his interest in fishes, but in June that year he had already begun commissioning fish drawings and he may have collected specimens prior to this. One list of fishes (notebooks pp. 29–32) is on paper watermarked 1826. There is no reference to fishes in his letters to Banks. It would seem that fishes occupied his interest during his third and final tour of service and that he probably brought drawings and specimens back with him on his retirement in 1831.

John Reeves' first wife Sarah (*née* Russell) died in 1810 and when Reeves went to China two years later he left his four children in the charge of his sister Rachel. In 1816 he married Isabella Andrew, presumably during his first period of leave, but the children appear to have stayed in England. Thus the eldest son, John Russell Reeves (1804–77), did not join his father in Canton until he was 23. The career of J. R. Reeves was surprisingly similar to that of his father. He joined the East India Company and in 1827 took up the appointment of Assistant Inspector of Teas in Canton. On this first trip to China he kept a diary which shows a lively interest in the birds and fishes observed during the long voyage. Like his father, J. R. Reeves collected plants for herbarium purposes as well as for introduction to English gardens. He also collected fish specimens and these, like his father's, are now in the

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* Dr. Morrison was one of the few Englishmen in China at that time who had thoroughly mastered Chinese. A portrait of him by George Chinnery shows Morrison with two Chinese assistants translating the Bible.

British Museum (Natural History). In 1839 he married his first cousin Elizabeth Conway* and on his retirement he returned to England and lived at Wimbledon until his death in 1877.

The British Museum received two sets of Reeves fish drawings, presented by the widow of J. R. Reeves in 1877, of which one set was later given to the Zoological Society of London. Two further sets came to the British Museum, one from Major-General Hardwicke (1835) and one from Sir John Richardson (1860). In addition to these, the British Museum also received (in 1877) five further zoological volumes, containing drawings of mammals, birds, reptiles (including some crustaceans, insects and amphibia), molluscs and crustaceans, and insects, the birds and insects predominating. There are probably over a thousand drawings in these five volumes, all showing the same delicacy and accuracy evident in the fish drawings. The library catalogue gives a total of 481 animal drawings received at this time, that is to say *folios*, since there were 481 drawings of fishes alone (including duplicates).

The British Museum also received in 1877 some 911 Reeves drawings of plants from J. R. Reeves' widow. According to Synge (1953), John Lindley commissioned botanical drawings from Reeves for the Royal Horticultural Society, but these drawings were dispersed when the Society's library was sold in 1858. Reginald Cory bought five volumes (628 sheets) in 1908 and in 1936 presented them to the Horticultural Society once more. Then in 1953 a further three volumes of drawings were offered for sale by a London bookseller and these were bought by the Society (mainly depicting chrysanthemums, camellias and paeonies).

John Reeves not only commissioned drawings but collected those which were currently produced by Chinese artists for Europeans. These " stock " pictures of natural history subjects, which are often highly finished and perhaps more satisfying aesthetically than the true " Reeves " pictures, must have been made from a master copy. For example, there is a drawing of a water melon in the Reeves Collection which exactly matches one in the India Office Library (Cat. No. NHD.42). But this drawing could not have been commissioned by Reeves since it was in the India Office before Reeves went to China (Archer, 1962 : 100 and pl. 12). Many of the insect and bird drawings now bound with the Reeves Collection in the Zoological Library of the British Museum (Natural History) are clearly " stock " pictures.

The mammal volume in the Zoological Library contains a mezzotint entitled " John Reeves " which has been bound in as the first page. The portrait was painted and engraved by T. Hardy and was " respectfully inscribed to the Committees of Associations, at the Crown & Anchor & the St. Albans Taverns & other Loyal Constitutional Associations in Great Brittain (sic) . . ." by the artist.† The subject of this portrait, however, is another John Reeves (1752–1829), a cousin of the first and a lawyer who rose to be Chief Justice of Newfoundland. Portraits of

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[*] A sketch book, in the possession of the Goodman family, contains some exquisite flower paintings signed by Elizabeth Conway (in 1824); these were clearly inspired by the Chinese paintings in the collection of her future father-in-law, seen during the latter's second leave.

[†] A sheaf of papers within the picture proclaims " *Associations for preserving Liberty & Property against Republicans and Levelers.* Nov. 20th, 1792 ". Clearly the sitter was no Radical but a firm supporter of Mr. Pitt and the Establishment! Bitterly opposed to Reeves and his reactionary associations were my own forbears, the Rathbones of Liverpool.

John Reeves of Canton are now in the possession of the Goodman family. They include some photographs, two miniatures and two portraits in oils, of which the latter are almost certainly by Chinnery* (one reproduced here—frontispiece). There are also photographs of J. R. Reeves and a Chinnery portrait sketch in pencil (see frontispiece).

Unless otherwise stated, details of the Reeves family have been drawn from documents, letters, etc. belonging to the Goodman family (see Acknowledgements).

THE FOUR SETS OF REEVES FISH DRAWINGS

According to Richardson (1846 : 188), there were four sets of Reeves fish drawings made. Three of these are now in the Zoological Library of the British Museum (Natural History)—the Reeves, Hardwicke and Richardson sets—and the fourth set, formerly believed lost, is in the library of the Zoological Society of London. The drawings vary somewhat between the sets, both in colour intensity and type of paper used, but the Richardson set must be regarded as the definitive one for systematic purposes because it was the one used by Richardson for his descriptions (except for one or two drawings only found in the Reeves set). The copies may not necessarily have been executed at the same time as the originals.

The Reeves set

A bound volume, 23½ × 19½ inches, contains 481 figures (124 folios) of fishes. Against each drawing is a number (red ink, occasionally black or pencil), the numbers running consecutively on each page, but the pages rearranged. These are the Reeves numbers cited by Richardson in his Report and they correspond with the numbers in Reeves' notebooks (see below, p. 199). The drawings also bear the Chinese vernacular name in Chinese script, but there are no Latin names. The drawings are sometimes repeated on another page, and occasionally a whole page is duplicated, either wholly (pp. 2 and 3, pp. 53 and 54) or in part (p. 6 repeats pp. 2 and 3 except for fish at bottom of page). Most of the drawings are on sheets of paper watermarked either J. Whatman 1825 (pp. 93, 96, 102, 108, etc.) or J. Whatman Turkey Mill 1829 (pp. 88, 101, 103, 104, 109, etc.). There are, however, drawings on slightly smaller paper (19½ × 15 inches) which is water-marked J. Whatman 1824 (p. 40 only) or 1826 (pp. 2, 6, 12, 13, 18, 20, etc.). These match those contained in the fourth set (see below). Finally, there are twenty-one drawings differing stylistically from the others (outlines softer, colours muted) which are water-marked J. Whatman 1805 (pp. 42, 43, 44, 66, 67, 75, 76, 82, 105–107). Four of these have a heraldic griffin stamped in black at one corner, a device which appears on other drawings, however, occasionally surmounting a shield; this is the Reeves crest. These are clearly drawings collected by Reeves, but not part of the main series.

The drawings were presented to the British Museum by Elizabeth Reeves, widow of J. R. Reeves, on her husband's death in 1877. There is a list of these drawings prepared by Günther, which gives page references to Günther's Catalogue and Richardson's Report; 286 species are included.

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* John Reeves was a personal friend of the artist George Chinnery, who lived in Macao from 1825 until his death in 1852.

Hardwicke set

Four bound folio volumes amongst the Hardwicke collection of drawings in the Zoological Library of the British Museum (Natural History) contain Reeves fish drawings (representing 328 species according to Richardson). The drawings have been cut from their original pages and remounted in systematic order, with other (*non*-Reeves) drawings interpolated. Each drawing is numbered (1–165, 166–313 in vol. 20a and b; 1–174, 175–317 in vol. 21a and b), many still bear the Reeves number (red ink) and Chinese ideogram, and all the Reeves drawings are named and have a page reference to Richardson's Report. Earlier identifications of the Hardwicke fish drawings, as well as notes by Hardwicke himself, are often pencilled against the drawings.

Major-General Hardwicke (1756–1835) began his collection of illustrations of Asiatic zoology at the end of the eighteenth century and continued until his return to England in 1823. In 1830–35, J. E. Gray named 200 of the Hardwicke illustrations of Indian animals and these were published as *Illustrations of Indian Zoology*. The Reeves notebooks (see below) list forty-six sheets (194 drawings of Chinese fishes) sent home to General Hardwicke in 1829–30, and Hardwicke may perhaps have intended that these too should be published. He did, indeed, bequeath these and his other drawings (as well as specimens) to the British Museum, together with a sum of money to defray the expense of publishing the scientific description of them, but the latter scheme was abandoned because of a Chancery suit instituted soon after his death (Dawson, 1958).

Hardwicke's books, drawings and specimens came to the British Museum in about July, 1835, and it was his set of Reeves drawings that was consulted by visiting ichthyologists until the Richardson set came to the British Museum, twenty-five years later.

Richardson set

Sir John Richardson (1787–1865) was lent a set of Reeves fish drawings and these are now contained in a bound volume. On the fly-sheet is inscribed " Sir John Richardson's set of drawings of Chinese fish by native artists (one of four) prepared under the supervision of J. Reeves (used by Richardson for his ' Report ') ". The " Report " (hereafter referred to merely as the Report) is Richardson's *Ichthyology of the seas of China and Japan*, delivered as a report to the British Association in 1845 and published in 1846.

The drawings have been cut from their original sheets and remounted in the systematic order used in the Report. Each drawing is named and a page reference to the Report is given; the Reeves numbers (in red ink) and the Chinese ideograms match those on the other sets. The Richardson volume contains 146 folio pages and about 350 drawings.

The Richardson set was given to Günther in 1860 for the preparation of his catalogue of fishes (see below, p. 200).

The " Fourth " set

In the Report (p. 188) Richardson stated that " Mr. Reeves had four copies of these drawings made ". Richardson then mentioned the Hardwicke set, his own set and another copy " left by Mr. Reeves at Macao with Mr. Beale [which] formed the groundwork of the enumeration of Chinese fish in Bridgeman's ' Chrestomathy ' . . ."

Richardson gives no details of another set, but it must be presumed to be the present Reeves set, retained by John Reeves, passed to his son and presented to the British Museum in 1877. Thus the fourth set must have been the one left in Macao.

It was reported previously (Whitehead, 1966) that the fourth set was not in the British Museum, the British Museum (Natural History) nor in the library of the India Office, and might be in private hands. Recently, however, a letter has been found from Elizabeth Reeves to Dr. Günther, dated 4th July, 1877, in which she states " I beg to say that I shall be greatly obliged if you will forward the Duplicate Drawings to the Zoological Society as you kindly propose, only I should wish you to send them in the name of my late husband* John Russell Reeves." (letter in Zoology Department of the British Museum (Natural History)).

In the library of the Zoological Society of London is a bound volume of Reeves drawings, including fishes, and this is undoubtedly the fourth set. It contains drawings of mammals (pp. 1–8), birds (pp. 9–38), reptiles (pp. 39–49), fishes (pp. 50–122) and crustaceans (pp. 123–129, including a fish, an octopus and a cuttlefish). There are up to five fishes on each page, in most cases matching the arrangement on the pages of the Reeves set.

The drawings are on smaller sheets of paper (19½ × 15 inches) than in the Reeves set, but match the few smaller ones in that set. On twenty-seven pages the date and the drawing number have been written on the reverse of the page. The dates and the numbers show that these paintings at least were those executed by Asung at Macao between March and September, 1829, as stated in the notebooks (see below, p. 200).

This set of drawings is acknowledged in the Report of the Council of the Zoological Society for 1877 (p. 13, A collection of 125 sheets of duplicates of original drawings of animals in the collection of the late John Russell Reeves, Esq., F.R.S., F.Z.S. Presented by Mrs. Reeves). It would appear that it came first to the British Museum, probably together with the present Reeves set, and in sorting out the duplicates Günther to some extent mixed the two sets, so that the Reeves set now contains some smaller drawings dated on the back, i.e. characteristic of the fourth set. This would explain why not all of the fourth set pages are dated; it also suggests that there was indeed a " master " set from which the others were copied, although it is not possible to say which that was.

JOHN REEVES' NOTEBOOKS

There are two bound volumes in the Zoological Library of the British Museum (Natural History) which contain MS. lists of drawings, notes, etc. made by John

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* Elizabeth Reeves has hitherto been cited as the sister of J. R. Reeves in British Museum records of the drawings.

Reeves in 1828–30. The second volume contains merely an original listing, of which there is a fair copy in the first volume. The notes were probably bound up in about 1846, but appear to have been received by the British Museum together with the Hardwicke drawings (i.e. 1835). There is an index of the notes, in Reeves' hand, evidently added later, perhaps at the time of binding. The notes add a certain amount of background to the compilation of the drawings.

Dates, localities, artists

Nos. α 1–54: at Macao ?, by Akut, 5th June to 22nd July, 1828.
Nos. β 1–103: at Macao, 84–95 + 103 (? all) by Akew, 1828.
Nos. 104–158: at Canton, artist not known (? Akam), Oct. to Nov., 1828.
Nos. 159–279: at Macao, by Asung, 5th March to 9th September, 1829.
Nos. 280–284: at Macao, by Asung, August, 1830.

Artists

Four artists are mentioned by name, Akut, Akam, Akew and Asung. Their names often appear in pencil against lists of drawings with the amount paid to them and the number of drawings done. Reeves seems to have paid one dollar for three drawings, but it is not clear if this included the three copies of each drawing or merely the original. According to the data given above, Akut did fifty-four drawings in forty-eight days, and Asung 120 drawings in 149 days, or about one drawing a day. It seems reasonable to suppose that the artist did the three copies at the same time as the original.

Hardwicke set

A list is given of forty-six sheets, containing 194 drawings of fishes, sent to General Hardwicke in 1829–30. Reeves must have sent other drawings to Hardwicke since the Hardwicke set contains over three hundred species of Chinese fishes.

Richardson set

There is a note, in Günther's hand, on the first page of the notebook stating " Duplicate series of Reeves drawings of Chinese Fish used by Sir J. Richardson for his B.A. Report, and transferred by him to Dr. G. in 1860 for the preparation of Catal. Fish.

Note: these are duplicates of those in bound volume that accompanies Hardwicke collection".

Gray

A list of fishes on pp. 34–35 of the first notebook includes names stated to have been supplied by J. E. Gray. If these notebooks came either to Gray or to Hardwicke, it is likely that some of the pencilled names on the Hardwicke set are by Gray. Thus, Gray probably used the drawings in the MS. list of fishes alluded to by Richardson (see below, p. 201).

Specimens

On pp. 29–32 is a list of fishes taken in the neighbourhood of Macao. The list is undated, but the paper is water-marked 1826. These may be the specimens subsequently sent to the British Museum. In the Report, Richardson sometimes identified a specimen as model for a drawing, but only because the sizes match.

Crustacea

The notes refer to drawings of crabs and shrimps, of which there is a bound volume of drawings in the Zoological Library of the British Museum (Natural History).

Chinese names

There is a list (pp. 73–84) of Chinese ideograms with their English rendering and translation by J. R. Morrison, who also included notes on the fishes.

Miscellaneous

On p. 68 Reeves criticized the assertion of Desfontaines and Valenciennes that the nests of *Hirundo esculenta* (the edible nest swallow) are made from the branches of a certain *Fucus*. " Tis curious " he writes, " that neither of these gentlemen should have discovered that the nest when burnt has the empyrumatic smell of *animal* matter which is not the case of any Fucus here. I have tried the Fucus of which we make our *Jellies* here—which has no bad smell when burnt—the Birds Nests have a decidedly *animal* smell ".

Other notes refer to plants, and they appear to be short memoranda which he probably wrote up more fully elsewhere.

USE MADE OF THE REEVES FISH DRAWINGS

The Reeves drawings were first used by J. E. Gray, later Keeper of the Zoological Department of the British Museum, who examined the set that Hardwicke later bequeathed to the Museum (1835). According to Richardson (Report: 193, 291), Gray had commenced an analysis of these drawings, and Richardson gives the authority for nine species (*Upeneus biaculeatus*, *Cyprinus ? fossicola*, *Cyprinus carassoides*, *Leuciscus nobilis*, *Leuciscus acutus*, *Leuciscus plenus*, *Ilisha abnormis*, *Chatoessus maculatus* and *Congrus fasciatus*) as " Gray, Cat. Brit. Mus." No such catalogue was ever published;* it was probably a manuscript (now lost) and would have formed a continuation from his list of cartilaginous fishes, which was not published until five years after Richardson's " Report " (Gray, 1851). Thus, the nine species must be attributed to Richardson. In three cases there were Reeves specimens, usually with a drawing, but the remainder were based solely on a drawing.

Gray (1831) had earlier published a description of three new fishes based on Reeves specimens, but with no mention of drawings (*Leucosoma reevesii*, *Samaris cristatus* and *Cestracion zebra*), and this appears to be the first indication of Reeves fishes reaching the British Museum. According to the Reeves notebooks (see above, p. 200), Reeves sent a set of drawings to General Hardwicke in 1829–30. Gray lived quite close to Hardwicke (Dawson, 1946), and since he was at that time (1830–35) preparing Hardwicke's collection of drawings of Indian animals for publication, he probably saw the Reeves drawings shortly after they arrived in England, and may have supervised their arrangement. In the notebooks (see above, p. 200) there is a list of fish names and drawing numbers, and it is stated that the names were given by Gray.

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* The 1162 papers written by J. E. Gray (some not published) were listed by him and the list, with a brief foreword by J. Saunders, was printed for private circulation and issued by Mrs. Gray after his death in 1875.

Gray's vast ouput of papers, which covered almost all groups of animals, indicates an energy and enthusiasm which must inevitably have led to the shelving of some projects while new ones were seized upon. This is borne out in his correspondence (General Library, British Museum (Natural History)), where Hardwicke seriously considers William Swainson for the continuation of the series on Indian Zoology, or where Edward Rüppell almost despairs of any co-operation from Gray after a most cordial beginning to their exchange of specimens and books. One can surmise, therefore, that the Reeves drawings and specimens were yet another of the projects that Gray began but had to lay aside.

After Gray, the next ichthyologists to use the Reeves drawings were Johannes Müller (1801–58) and Friedrich Henle (1807–85). The MS. Reports of the Zoological Society of London record that Müller examined the Society's collection of cartilaginous fishes on the 7th to 20th September, 1837. Müller & Henle (1841) cite Reeves drawings for seven species (*Chiloscyllium plagiosum*, *Sphyrna zygaena*, *Platyrrhina sinensis*, *Trygon uarnak*, *Pteroplatea micrura*, *Myliobates nieuhofii* and *M. maculatus*) and for these they quote the figure numbers of the Hardwicke set. None of the Müller & Henle figures, however, was taken from a Reeves drawing.

Richardson (Report: 188) stated that a number of leading ichthyologists had examined the Reeves drawings. Cuvier was in London in May, 1818 (letter from Sir Joseph Banks to Sir Charles Blagden—see Dawson, 1958), but visited again in August, 1830 (Atkins, 1853 : 250) when the drawings were with Hardwicke; possibly he saw them. It would seem that Valenciennes just missed them, having visited London in late February, 1829 (letter to Gray, now in Zoology Department, British Museum (Natural History)); Hardwicke had probably not yet received his set of drawings by then (sent by Reeves in 1829–30 according to the notebooks). Valenciennes did see other Chinese drawings of fishes at the British Museum but these were not part of the Reeves collection (note by Richardson in the Report: 287).

The Reeves drawings were most fully used by Richardson. In his *Report on the Ichthyology of the Seas of China and Japan* (1846) he listed 671 species or varieties of fishes and identified 332 of them with a Reeves illustration (plus twelve duplicates). Richardson described 152 species or varieties as new, and based seventy-seven of these solely on a Reeves drawing, and forty-one on a drawing and on a specimen or previous description. His colour descriptions, often of prime importance in the diagnosis of the species, were almost all derived from the Reeves drawings. In fact, Richardson claimed that " These drawings are executed with a correctness and finish which will be sought for in vain in the older works on ichthyology, and which are not surpassed in the plates of any large European work of the present day." The claim is justified, in many cases even today.

In his *Zoology of the Voyage of H.M.S. Sulphur* (1844–45—hereafter referred to as Sulphur), Richardson based six new species solely on Reeves drawings, and nineteen species on drawings and specimens. In this work he illustrated eight species with a figure taken from a Reeves drawing (see list, p. 204).

Richardson's Report is a mine of incidental information, with many scattered references that are of value in problems of dating, location of specimens, etc. Unfortunately, the 600 species are listed in what is now an unfamiliar arrangement of orders and families, and there is no index. To overcome this difficulty, an index to the Report is given at the end of the present paper in which both the page number of the Report and the Reeves drawing numbers are cited.

An interesting source for some of Richardson's descriptions in the Report is a work cited (Report: 188) as " 'Descriptions of Animals', being an account, in the Linnaean method, of the various species, both terrestrial and marine, observed in a voyage to India and China, with pen and ink figures of small size, but well-executed. The author is unknown." This is an unpublished work listed as part of Banks' library by Dryander (1796, vol. 2 : 20), having come from the library of John Fothergill (1712–80). This work is in the Zoological Library of the British Museum (Natural History). The first volume (Banksian MS. 84, 181 folios) contains descriptions of animals (mammals, birds, reptiles, amphibians, fishes, molluscs, crustaceans) and the second (MS. 85, 79 folios) contains small pen and ink drawings. Richardson used this work as the basis for some of his species (*Polyacanthus* ? *paludosus*, *Leuciscus plenus* and *Gobioides melanurus* for example). For the last of these species Richardson states (Report: 206) " The name of *Gobius melanurus* was written by Broussonet himself over the figure, and he mentions the species by the same appellation in his first decade " (i.e. his *Ichthyologia* of 1782, in which he refers to the MS). The manuscript, which is written in English, often gives only a generic name and in many cases a species name has been added in pencil, presumably by Broussonet. The latter spent two years in England (1780–82 *fide* Carter, 1964 : 47) working closely with Joseph Banks and having access to his library and collections as well as to those at the British Museum.*

The authorship of the manuscript was unknown to Dryander (1796 : 120), Banks' second librarian, and presumably also to Fothergill. The use of English in the descriptions is unusual for this period and suggests a keen but untrained naturalist, possibly a man like J. R. Reeves, anxious to while away his time during the long voyage to Canton.

REEVES FISH DRAWINGS ALREADY PUBLISHED

The following thirty-eight Reeves drawings have been published as half-tone illustrations, either from photographs or redrawn from the originals. Species based solely on a Reeves drawing are shown in bold-face italic.

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* Broussonet made two further visits to England, the first in about March, 1786 and the second in June, 1803; the first visit resulted in a short paper on a sailfish brought back from the third Cook voyage (Broussonet, 1786) but thereafter Broussonet's interest in ichthyology gave way to his commitments to rural economy and agriculture (Carter, 1964).

Richardson (in Sulphur)

Pl. 36 (4) *Callionymus reevesii* from Reeves 180.
Pl. 39 (4) *Pelor cuvieri* from Reeves 164.
Pl. 49 (2) ***Muraena reevesii*** from Reeves 68.
Pl. 51 (1) ***Anguilla avisotis*** from Reeves 222.
Pl. 52 (7) ***Monopterus*** (or ***Synbranchus***) ***xanthognathus*** from Reeves 221.
Pl. 60 (2) ***Balistes hihpe*** from Reeves α 35.
Pl. 61 (2) ***Tetrodon laterna*** from Reeves 99.
Pl. 62 (1) *Balistes frenatus* from Reeves (229).

Mees (1962)

Pl. 1 (1, 2) ***Belone ciconia*** from Reeves (both Reeves and Richardson versions shown).

Trewavas & Yazdani (1966)

Pl. 6A *Otolithus aureus* from Reeves 234.

Whitehead (1966)

Pl. 1 (2) *Clupea isingleena* from Reeves 60.
Pl. 1 (3) *Clupea nymphaea* from Reeves β 25 (also reproduced by Chan 1965 : fig. 11).
Pl. 2 (1) ***Clupea caeruleo-vittata*** from Reeves 59.
Pl. 2 (2) *Clupea flos-maris* from Reeves 64.
Pl. 2 (3) *Alosa reevesii* from Reeves α 8.
Pl. 3 (1) *Alosa palasah* from Reeves β 57.
Pl. 3 (2, 3) *Ilisha abnormis* from Reeves 81 and 67.
Pl. 4 (1) *Chatoessus aquosus* from Reeves 63.
Pl. 4 (2) *Chatoessus triza* from Reeves 224.
Pl. 4 (3) *Chatoessus chrysopterus* from Reeves 61.
Pl. 5 (1) *Chatoessus maculatus* from Reeves 109 (also pl. 1 (i) in Whitehead & Joysey, 1967).
Pl. 5 (2) *Coilia grayii* from Reeves α 14.
Pl. 5 (3) *Coilia playfairii* from Reeves β 26.
Pl. 6 (1) *Thryssa mystax* from Reeves 138.
Pl. 6 (2) *Megalops setipinnis* from Reeves 96.
Pl. 6 (3) ***Megalops curtifilis*** from Reeves 136.
Pl. 7 (1) *Elops machnata* from Reeves 137.
Pl. 7 (2) ***Elops purpurescens*** from Reeves 53.
Pl. 7 (3) *Chirocentrus dorab* from Reeves 47.

Whitehead & Joysey (1967)

Pl. 1 (2) *Caranx cancroides* from Reeves β 30.
Pl. 1 (3) *Trachinotus melo* from Reeves 97.
Pl. 1 (4) *Solea ommatura* from Reeves β 13.

Pl. 2 (1) *Serranus shihpan* from Reeves 71.
Pl. 2 (2) *Priacanthus tayenus* from Reeves *β* 14.
Pl. 2 (3) *Sebastes vachellii* from Reeves 69.
Pl. 3 (1) *Pelor tigrinum* from Reeves *β* 42.
Pl. 3 (2) *Apocryptes serperaster* from Reeves *β* 55.
Pl. 3 (3) *Gobius platycephalus* from Reeves 194.
Pl. 3 (4) *Julis exornatus* from Reeves *β* 10.

TYPE SPECIMENS

Nearly two hundred new species, subspecies or varieties were described by Richardson in the Report, Sulphur, Erebus & Terror and *Ann. Mag. nat. Hist.*, of which eighty-three species were based solely on a Reeves drawing; sixty-six species were based on a drawing and specimens or a previous description; and the remainder were based on specimens alone. In the list of Reeves drawings given here, reference is made to extant type specimens. Specimens have been found for thirty-three of the species listed, but for twenty-eight species the material appears to be lost or in some cases is known to have been destroyed. Most of the specimens come from either John or J. R. Reeves, but some were derived from the Vachell and other collections.

Reeves

Since Gray published on John Reeves' fish specimens in 1831 (see above, p. 201), it seems probable that Reeves brought these specimens back with him on his retirement in that year. The present system of registration of fishes, which gives the date of incorporation (year, day, month, specimen number), was not begun by Gray until 1837, so that none of the Reeves fishes was registered at the time. Gray most probably had a list, but this has not survived.*

J. R. Reeves also sent specimens to the British Museum. One can usually distinguish between specimens from the two Reeves, the John Reeves specimens being marked " Reeves " or " John Reeves ", while those collected by his son are labelled " J. R. Reeves ". The total number of Reeves specimens is difficult to estimate because Richardson often refers to " Brit. Mus. Spec." from Canton, and such specimens might have been sent by other collectors.

The Reeves specimens are either preserved in alcohol or are dried, often mounted. The mounted specimens appear to have been used for display and the wooden base is often (but not invariably) inscribed with Reeves' name and locality.

Vachell

The Rev. George Vachell, Chaplain to the Factory of the East India Company at Macao in about 1830, made a collection of about a hundred fishes which he presented to the Cambridge Philosophical Institution. Richardson examined these specimens and used them as the basis for descriptions of twenty-two new species. The fate of the Vachell collection, of which only fifteen specimens now survive, was examined by Whitehead & Joysey (1967).

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* Günther, in his Catalogue of Fishes in the British Museum (1859–70), seems to have had access to such a list since he records material from the Cook voyages (1768–80) for which there is often no evidence on the labels of the jars or on the specimens; many of these are stated to derive from the 'Old Collection'.

Chinese collections at Hyde Park

Richardson (Report: 189) listed various other sources of material—Haslar Hospital, Royal College of Surgeons, India House—but then stated that " An assemblage of Chinese fish, exceeding all these in number, exists in the Chinese collection, made by Mr. Dunn, and now exhibiting at Hyde Park. The proprietor most liberally permitted me to examine this important collection; but owing to my residence at a distance from London, and the way in which the bottles holding the fish are secured in screwed up cases, I have not been able to avail myself of this permission to the necessary extent for the identification of known species or the description of new ones ". Nevertheless, Richardson mentions the Hyde Park collection frequently in his notes on new or described species. It can, however, be accepted that no type material is attributable to this collection (see for example Sulphur : 109).

The Chinese collection was exhibited at St. George's Place, Hyde Park Corner by an American, Mr. Nathan Dunn, from 1842 until 1845 (and perhaps after this). The collection, which resulted from some years residence in China, was first shown in Philadelphia in 1838, where it attracted considerable interest. It contained objects illustrating all aspects of Chinese life and culture. In addition, there were four natural history cases, six cases of birds, four cases of shells, two of butterflies, one of other insects and finally a case (No. LX) containing " Various specimens of fish from the waters of China, so prepared and preserved as to need only their natural element to give them the appearance of life " according to Langdon* (1843 : 112).

Two catalogues of Nathan Dunn's collection were published in Philadelphia (Dunn, 1839 and Wines, 1839), but in neither of these are the fish specimens mentioned although both refer to fish drawings. Richardson also mentioned these drawings in the Report and it is tempting to think that they derived from Reeves. The records of the Academy of Natural Sciences in Philadelphia show that Dunn became a corresponding member in 1828 *while residing in Canton*, and he would almost certainly have known both John Reeves and his son since they shared so many interests. The Philadelphia Museum of Art possesses a copy of the catalogue by Wines (*loc. cit.*) in which a previous owner has pencilled in notes on Dunn. According to these, Dunn came from southern New Jersey, embarked on a mercantile life, spent nine years in China and opened the Chinese Museum in Philadelphia on 22nd December, 1838. Dunn was apparently a bachelor and Miss Gordon Lee of the Philadelphia Museum of Art informs me that he died in Vevey in Switzerland on 15th September, 1844. This would explain Richardson's final reference to Nathan Dunn in the Report (p. 193) as the " late proprietor ".

The fate of the Dunn collection is uncertain. There is no reference to this collection in the acquisition lists of natural history material donated or sold to the British Museum; neither is there any reference to art works in the registers of the Victoria and Albert Museum in London or the Philadelphia Museum of Art. According to

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* William B. Langdon was Curator of the Chinese Collection. He compiled a catalogue which ran to two editions (1842, 1843).

Shinn (1957) the collection, after it was shown in London, was shipped to Edinburgh, damaged en route and eventually largely destroyed by fire.

The only other reference to Dunn is his philanthropic donation of $50 to transfer books to Philadelphia from Robert Owen's by then failing socialist colony at New Harmony on the Wabash River.* This must have occurred in 1827, for by the next year Dunn was in Canton.

LIST OF REEVES FISH DRAWINGS

The following list comprises 332 Reeves drawings catalogued under the names used by Richardson (which are also written against the drawings in the Richardson set). The genus and species names are alphabetically arranged within families, and the arrangement, spelling and synonymies of the families follow Greenwood *et alii* (1966).

Each name is followed by a page reference to its appearance in Richardson's works (i.e. Report, Sulphur, etc.), and the Reeves' drawing number (cited as R. 174, R. α48, R. β32, etc.). Previously published figures taken from Reeves drawings are cited in parenthesis immediately after the Reeves number.

Species described as new by Richardson partly or wholly on the basis of a Reeves drawing are shown in bold face italic (remainder plain italic). Species based solely on a Reeves figure are marked with an asterisk. Type or possible type specimens are listed with the prefix BMNH. (or UMZC. for Vachell material in the University Museum of Zoology in Cambridge).

Occasional references to Günther's " Catalogue " are cited as Günther, followed by the volume number and page.

Reference to plates in the present work is made in bold face following each citation.

HETERODONTIDAE

1. *Cestracion zebra*, Report 195, R. 174.

SCYLLIORHINIDAE

2. *Chiloscyllium plagiosum*, Report 194, R. 252, α2.
3. *Scyllium maculatum*, Report 193, R. 264.

CARCHARHINIDAE

4. *Carcharias* (*Scoliodon*) *acutus*, Report 194, R. α5.
5. *Carcharias* (*Prionodon*) *dussumieri*, Report 194, R. α1.
6. *Carcharias* (*Prionodon*) *melanopterus*, Report 194, R. α3.

SPHYRNIDAE

7. *Sphyrna zygaena*, Report 194, R. α4.

RHINOBATIDAE

8. *Platyrhina sinensis*, Report 196, R. 182.

*9. ***Rhinobatus hynnicephalus***, Report 195, solely on R. α7. **Pl. 11a.**

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* Books had been an important element in this colony where, among the intellectuals, were men like Say the conchologist, LeSueur the superb natural history artist and the eccentric naturalist Rafinesque. The young Abraham Lincoln is said to have seen the colonists pass up the river on their way to New Harmony and to have begged his father to let him join them—not through any incipient communistic tendencies, but because the colonists had books and he was desperate to learn.

RHYNCHOBATIDAE

10. *Rhina ancylostomus*, Report 195, R.β74.

TORPEDINIDAE

*11. ***Narcine lingula***, Report 196, on R. 227 and fig. by Dr. Wight. **Pl. 11b.**
12. Muh cho poo, Report 196, R.6 (not named).

RAJIDAE

13. *Raia kenojei*, Report 197, R.198.

DASYATIDAE

14. *Trygon bennettii*, Report 197, R.α45.
*15. ***Trygon carnea***, Report 197, solely on R. 226. **Pl. 1a.**
16. *Trygon uarnak*, Report 197, R.α7, 279?

MYLIOBATIDAE

17. ? *Aetobates flagellum*, Report 198, R.273, ?236.
18. *Myliobates maculatus*, Report 198, R.212.
19. *Myliobates nieuhofii*, Report 198, R.α38.

GYMNURIDAE

*20. ?***Myliobates oculeus***, Report 198, solely on R. 281 (Reeves copy p. 104). **Pl. 11c.**
21. *Pteroplatea micrura*, Report 197, R.α48, 209, 235.

ELOPIDAE

22. *Elops machnata*, Report 311, R.137 (pl. 7i in Whitehead, 1966).
*23. ***Elops purpurescens***, Report 311, solely on R.α53 (pl. 7ii in Whitehead, 1966).
*24. ***Megalops curtifilis***, Report 310, solely on R.136 (Whitehead, 1966: pl. 6iii).
25. ***Megalops setipinnis***, *Ann. Mag. nat. Hist.*, **10** : 493, Report 310, R.96 (pl. 6ii in Whitehead, 1966) and on specimens (BMNH.1964.11.6.14—HOLOTYPE, a skin from Port Essington).

ANGUILLIDAE

*26. ***Anguilla avisotis***, Sulphur 104, Report 312, solely on R.222 (pl. 51i in Sulphur).

MURAENIDAE

*27. ***Muraena cerino-nigra***, Report 314, solely on R. no number (drawing not found).
28. ***Muraena isingleena***, Sulphur 108, pl. 48i (as *isingteena*), Report 314, on R.237 and Reeves specimens (apparently lost).
*29. ***Muraena reevesii***, Sulphur 109, Report 314, solely on R.68 (pl. 49ii in Sulphur).
30. ***Muraena thyrsoidea***, Sulphur 111, pl. 49i, Report 314, on R.220 and Reeves specimens (apparently lost).

MURAENESOCIDAE

31. *Congrus tricuspidatus*, Report 312, R.α41.

CONGRIDAE

*32. ***Congrus fasciatus***, Report 312, solely on R. 284. **Pl. 12a.**

CLUPEIDAE

33. *Alosa palasah*, Report 306, R.β51 (pl. 3i in Whitehead, 1966).
34. ***Alosa reevesii***, Report 305, on R.α8 (pl. 2iii in Whitehead, 1966) and on Reeves specimen (BMNH.1963.8.20.2—HOLOTYPE).

35. ***Chatoessus aquosus*,** Report 307, on R.63 (pl. 4i in Whitehead, 1966) and on Reeves specimen (BMNH.1964.11.6.5).
36. ***Chatoessus chrysopterus*,** Report 308, on R.61 (pl. 4iii in Whitehead, 1966) and on Descr. Anim.: 200, fig. 148 (see above, p. 203).
37. ***Chatoessus maculatus*,** Report 308, on R.109 (pl. 5i in Whitehead, 1966) and on Vachell specimen (lost—Whitehead & Joysey, 1967).
38. *Chatoessus triza*, Report 307, R.224 (pl. 4ii in Whitehead, 1966).

*39. ***Clupea caeruleo-vittata*,** Report 305, solely on R.59 (pl. 2i in Whitehead, 1966).

40. ***Clupea flos-maris*,** Report 305, on R.64 (pl. 2ii in Whitehead, 1966) and on Descr. Anim.: 201, fig. 149 (see above, p. 203).
41. ***Clupea isingleena*,** Report 304, on R.60 (pl. 1ii in Whitehead, 1966) and on Reeves specimen (BMNH.1963.6.17.1).
42. ***Clupea nymphaea*,** Report 304, on R.β35 (pl. 1iii in Whitehead, 1966) and on Reeves specimen (? lost—Whitehead, 1966 : 27).
43. ***Ilisha abnormis*,** Report 306, on R.67, 81 (pl. 3ii and iii in Whitehead, 1966) and on Reeves specimen (BMNH.1964.11.6.4—HOLOTYPE).

ENGRAULIDAE

44. ***Coilia grayii*,** Sulphur 99, pl. 54i and ii, Report 309, on R.α14 (pl. 5ii in Whitehead 1966) and on Capt. Dawkins specimen (BMNH.1855.9.19.1581—HOLOTYPE).
45. *Coilia playfairii*, Report 309, R.β26 (pl. 5ii in Whitehead, 1966).
46. *Thryssa mystax*, Report 309, R.138 (pl. 6i in Whitehead, 1966).

CHIROCENTRIDAE

47. *Chirocentrus dorab*, Report 311, R.β47 (pl. 7iii in Whitehead, 1966).

SALANGIDAE

48. *Leucosoma chinensis*, Report 303, R.144.

SYNODONTIDAE

*49. ***Saurus argyrophanes*,** Report 302, solely on R. β15. **Pl. 12b.**

50. *Saurus lemniscatus*, Report 301, R.188.
51. *Saurus variegatus*, Report 301, R.187.

HARPADONTIDAE

52. *Saurus nehereus*, Report 301, R.α18.

CYPRINIDAE

53. *Abramis bramula*, Report 294, R.108.

*54. ***Abramis terminalis*,** Report 294, solely on R. 80. **Pl. 12c.**

55. *Barbus deauratus*, Report 294, R.154.

*56. ***Cyprinus abbreviatus*,** Report 292, solely on R. 124. **Pl. 13a.**
*57. ***Cyprinus acuminatus*,** Report 289, solely on R. 125. **Pl. 13b.**
*58. ***Cyprinus atro-virens*,** Report 287, solely on R. 116. **Pl. 14a.**

59. *Cyprinus auratus*, Report 293, R.121.

*60. ***Cyprinus carassoides*,** Report 291, solely on R. 126. **Pl. 14b.**
*61. ***Cyprinus flammans*,** Report 285, solely on R. 118. **Pl. 15a.**
*62. ***Cyprinus* ? *fossicola*,** Report 291, solely on R. α40. **Pl. 15b.**

63. *Cyprinus gibeloides*, Report 292, R.123.

*64. ***Cyprinus hybiscoides*,** Report 289, solely on R. 156. **Pl. 16a.**

65. *Cyprinus nigro-auratus*, Report 290, R.119.
66. *Cyprinus rubro-fuscus*, Report 288, R.117.

*67. ***Cyprinus sculponeatus*,** Report 290, solely on R. 120. **Pl. 16b.**

68. *Cyprinus viridi-violaceus*, Report 288, R.157.

69. ***Leuciscus acutus***, Report 297, on R.α42 and on Descr. Anim.: 205, fig. 194 (see above, p. 203).
70. ***Leuciscus bambusa***, Sulphur 141, Report 299, on R.286 and on Reeves specimen (BMNH.1962.2.8.1; 16 inches, HOLOTYPE).
71. ***Leuciscus curriculus***, Report 299, on R.141 and Reeves specimen (BMNH.1962.2.5.1 —8¾ inches, ? HOLOTYPE).
*72. ***Leuciscus recurviceps***, Report 295, solely on R. 149. **Pl. 17a.**
*73. ***Leuciscus hemistictus***, Report 296, solely on R. 133. **Pl. 17b.**
*74. ***Leuciscus homospilotus***, Report 300, solely on R. α20. **Pl. 17c.**
75. *Leuciscus idella*, Report 297, R.122.
*76. ***Leuciscus machaeroides***, Report 297, solely on R. 111. **Pl. 18a.**
77. *Leuciscus molitorella*, Report 296, R.110.
78. *Leuciscus molitrix*, Report 295, R.α54.
79. ***Leuciscus nobilis***, Sulphur 140, pl. 63iii, Report 295, on R.134 and on Reeves specimen BMNH.1968.3.11.4—stuffed, 14 inches, HOLOTYPE).
*80. ***Leuciscus piceus***, Report 298,solely on R. 153. **Pl. 18b.**
*81. ***Leuciscus xanthurus***, Report 298, solely on R. 112. **Pl. 18c.**

COBITIDAE

82. *Cobitis anguillicaudatus*, Report 300, R.278.
*83. ***Cobitis psammismus***, Report 300, solely on R. 145. **Pl. 19a.**

ICTALURIDAE

84. *Pimelodus guttatus*, Report 285, R.129, 130, 132.

BAGRIDAE

*85. ? ***Bagrus*** (an ***Pimelodus***?) ***bouderius***, Report 283, solely on R.203 (Descr. Anim. fig. 162 shows related species, not named). **Pl. 19b.**
*86. ***Pimelodus*** ? ***fulvi-draco***, Report 286, solely on R. 155. **Pl. 1b.**

SILURIDAE

87. *Silurus sinensis*, Report 281, R.131.
88. ***Silurus xanthosteus***, Sulphur 133, pl. 56xii–xiv, Report 281, on R.102 and Reeves and Cantor specimens (BMNH.1968.3.11.29—Cantor's *punctatus* types, *ex* Chusan).

CLARIIDAE

89. ***Clarias pulicaris***, Sulphur 135, pl. 62v and vi, Report 287, on R.β16 and Reeves specimen (BMNH.1968.3.11.21–22—the larger the HOLOTYPE).

ARIIDAE

90. ***Arius falcarius***, Sulphur 134, pl. 62vii–ix, Report 284, on R.101 and Reeves specimen apparently lost).
*91. ? ***Bagrus crinalis***, Report 282, solely on R. 217. **Pl. 19c.**
*92. ***Galeichthys stanneus***, Report 284, solely on R. 238. **Pl. 20a.**
*93. ***Pimelodus mong***, Report 286, solely on R. β20. **Pl. 20b.**

PLOTOSIDAE

94. *Plotosus lineatus*, Report 286, R.β11.

LOPHIIDAE

95. *Lophius setigerus*, Report 203, R.161.

OGCOCEPHALIDAE

96. *Halieutea stellata*, Report 203, R. no number.

EXOCOETIDAE

97. *Hemirhamphus intermedius*, Report 264, R.167.

BELONIDAE

98. *Belone caudimaculata*, Report 264, R.β33.
*99. ***Belone ciconia***, Report 264, solely on R.186 (pl. 1i and ii in Mees, 1962).

HOLOCENTRIDAE

100. *Holocentrum albo-rubrum*, Report 223, R.α19.
101. *Holocentrum spinosissimum*, Report 223, R.84.

FISTULARIIDAE

102. *Fistularia immaculata*, Report 247, R.185.

CHANNIDAE

*103. ***Ophicephalus jovis***, Report 252, solely on R. 143. **Pl. 2a.**
104. *Ophicephalus maculatus*, Report 251, R.β19, 148.
*105. ***Ophicephalus puticola***, Report 252, solely on R. 142. **Pl. 20c.**

SYNBRANCHIDAE

*106. ***Monopterus***? ***helvolus***, Report 316, solely on R. (p. 124s, no number), H. 312. **Pl. 20d.**
*107. ***Ophicardia xanthognatha***, Sulphur 118 (as ***Monopterus***), Report 316, solely on R.221 (as pl. 52vii in Sulphur).

SCORPAENIDAE

108. *Apistes alatus*, Report 213, R.169.
109. *Pterois lunulata*, Report 213, R.165.
110. *Pterois volitans*, Report 213, R.β1, 261.
*111. ***Scorpaena leonina***, Report 216, solely on R. 66. **Pl. 2b.**
112. *Sebastes pachycephalus*, Report 214, R.218.
113. ***Sebastes vachellii***, Report 214, on R.69? (pl. 2iii in Whitehead & Joysey, 1967) and on Vachell specimen (lost).

TRIGLIDAE

114. *Trigla burgeri*, Report 218, R.β3.
115. ***Trigla papillionacea***, Report 218, on R.159 and on Solander description (MS. in BMNH.), Parkinson drawing 104 (pl. 35 in Whitehead, 1968) and Chinese and Australian specimens (BMNH.1968.3.11.19—possibly seen by Richardson).

SYNACEJIDAE

116. *Pelor cuvieri*, Report 212, R.164 (as pl. 39iv in Sulphur).
117. *Pelor japonicum*, Report 212, R.140.
118. ***Pelor tigrinum***, Report 212, on R.β42 (pl. 3i in Whitehead & Joysey, 1967) and Vachell specimen (UMZC. II 151).

PLATYCEPHALIDAE

*119. ***Platycephalus cultellatus***, Report 217, solely on R. β28. **Pl. 21a.**
120. *Platycephalus guttatus*, Report 217, R.65.

CENTROPOMIDAE

121. *Lates calcarifer*, Report 222, R.α11.
122. *Lates nobilis*, Report 222, R.α10.

SERRANIDAE

123. *Diploprion bifasciatum*, Report 221, R.α27.
124. *Labrax japonicus*, Report 222, R.135.
125. ***Lobotes incurvus***, Report 237, on R.168 and British Museum specimen (BMNH.1968.3.11.7–8—two fishes, 9½–10½ inches, one claimed as type by Günther, **1** : 338).
126. *Plectropoma susuki*, Report 230, R.α34.
127. *Serranus altivelis*, Report 230, R.267.
*128. ***Serranus cyanopodus***, Report 249, solely on R. 249. **Pl. 3a.**
129. *Serranus formosus*, Report 233, R.α46.
130. ***Serranus gilberti***, *Ann. Mag. nat. Hist.*, **9** : 19, Report 230, on R.257 and on British Museum specimens (BMNH.1968.3.11.3—*ex* Port Essington, HOLOTYPE).
131. *Serranus marginalis*, Report 233, R.246.
132. ? *S. marginalis* juvenile, Report 234, R.255.
133. ***Serranus megachir***, Report 230, on R.113 and Reeves specimen (BMNH.1968.3.11.2—HOLOTYPE).
*134. ***Serranus reevesii***, Report 232, solely on R. 211. **Pl. 3b.**
135. ***Serranus shihpan***, Report 231, on R.71 (pl. 2i in Whitehead & Joysey, 1967) and on specimens from Vachell (?lost) and in British Museum (apparently lost).
136. ***Serranus stigmapomus***, Report 232, on R.72 and Reeves specimen which was model for figure (not recorded by Günther, **1** : 112—apparently lost).
*137. ***Serranus variegatus***, Report 231, solely on R. 87. **Pl. 4a.**

THERAPONIDAE

138. *Therapon oxyrhynchus*, Report 239, R.193.
139. *Therapon quadrilineatus*, Report 239, R.β34.
140. *Therapon servus*, Report 238, R.β44.
141. *Therapon theraps*, Report 238, R.α43.

PRIACANTHIDAE

142. ***Priacanthus tayenus***, Report 237, on R.β14 (pl. 2ii in Whitehead & Joysey, 1967) and on specimens from Vachell (lost) and Reeves (BMNH.1965.8.12.50—9¾ inches, SYNTYPE).

APOGONIDAE

143. *Apogon novem-fasciatus*, Report 221, R.β9.
144. *Apogon trimaculatus*, Report 221, R.70.

SILLAGINIDAE

145. *Sillago japonica*, Report 223, R.β40.

BRANCHIOSTEGIDAE

146. *Latilus argentatus*, Report 239, R.192.

LACTARIIDAE

147. *Lactarius delicatulus*, Report 272, R.170.

RACHYCENTRIDAE

148. *Elecate bivittata*, Report 269, R.172.

ECHENEIDAE

149. *Echeneis naucrates*, Report 203, R.97h.

CARANGIDAE

150. *Blepharis fasciatus*, Report 271, R.269.
151. ***Caranx cancroides***, Report 274, on R.β30 (pl. iii in Whitehead & Joysey, 1967) and on Vachell specimen (lost).
*152. ***Caranx cestus***, Report 274, solely on R. α39. **Pl. 4b.**
*153. ***Caranx chrysophrys*** var. ***hyemalis***, Report 275, solely on R. 239. **Pl. 21b.**
154. *Caranx flavo-caeruleus*, Report 275, R.213.
155. *Caranx forsteri*, Report 275, R.214.
156. *Caranx malabaricus*, Report 275, R.β21.
*157. ***Caranx margarita***, Report 276, solely on R. (no number, p. 126r), H.205 and Reeves copy, p. 124. **Pl. 21c.**
158. *Caranx muroadsi*, Report 274, R.β36.
159. *Caranx nigripes*, Report 275, R.181.
160. *Caranx rotleri*, Report 273, R.206.
*161. ***Chorinemus delicatulus***, Report 269, solely on R. i 92 (in Reeves copy p. 124). **Pl. 22a.**
*162. ***Chorinemus leucopthalmus***, Report 269, solely on R. 219. **Pl. 22b.**
163. *Gallichthys major*, Report 271, R.189.
164. *Seriola auro-vittata*, Report 271, R.230.
165. *Scyris indica*, Report 276, R.α17.
166. ***Trachinotus auratus***, Report 270, on R.104 and on Reeves specimen (apparently lost).

FORMIONIDAE

167. *Stromateus niger*, Report 272, R.194 (*Seserinus vachellii* Rich. belongs in this family—Whitehead & Joysey, 1967).

LEIOGNATHIDAE

168. *Equula nuchalis*, Report 276, R.g 90, b 58.
169. *Equula rivulata*, Report 276, R.c 86.

SPARIDAE

170. ***Chrysophrys auripes***, Report 241, on R.128 and on Reeves specimen (apparently lost).
171. *Chrysophrys berda*, Report 240, R.223.
172. *Chrysophrys cardinalis*, Report 241, R.199.
173. ***Chrysophrys xanthopoda***, Report 241, on R.85 and on Reeves specimen (apparently lost).
174. *Chrysophrys* sp., Report 241, R.95.

175. *Dentex setigerus*, Report 242, R.β58.
*176. ***Lethrinus anatarius***, Sulphur 145, Report 242, solely on R. 245. **Pl. 5a.**
177. *Lethrinus haematopterus*, Report 242, R.232.
178. *Pagrus unicolor*, Report 242, R.160.

SCIAENIDAE

*179. ***Corvina? albiflora***, Report 226, solely on R. β48. **Pl. 22c.**
180. *Corvina catalea*, Report 226, R.207.
181. ***Corvina grypota***, Report 225, on R.β12 and on Haslar Museum specimen (apparently lost).
182. ***Corvina nalla-katchelee***, Report 226, on R.225 and on two Reeves specimens (apparently lost).
183. *Corvina sina*, Report 225, R.94.
184. *Otolithus argenteus*, Report 225, R.200.
185. ***Otolithus aureus***, Report 224, on R.234 and on two Reeves fishes (lost—neotype designated by Trewavas & Yazdani, 1966).

186. ***Otolithus tridentifer***, Report 225, on R.β54 and on a British Museum specimen (apparently lost).
187. ***Sciaena crocea***, Report 224, on R.139 and on Reeves specimen (not found by Günther, **2** : 284; BMNH.1968.3.11.9—designated NEOTYPE by Trewavas, in press).
188. ***Sciaena lucida***, Sulphur 87, pl. 44iii and iv, Report 224, on R.β6 and on specimens in Cambridge (lost), Haslar Museum and British Museum (BMNH.1848.3.18.107–8—larger fish probably type *fide* Whitehead & Joysey, 1967).
189. *Umbrina russelii*, Report 226, R.β37.

MULLIDAE

190. *Upeneus bensasi* affin., Report 220, R.α44.
191. ***Upeneus biaculeatus***, Report 219, on R.α22 and on Reeves specimen (BMNH.1968.3.11.10–11—two skins, 7½ and 11½ inches, ? one the HOLOTYPE).
192. *Upeneus bilineatus* affin., Report 220, R.250.
193. *Upeneus chrysopleuron*, Report 219, R.268.
194. *Upeneus russelii*, Report 220, R.α36.
195. ***Upeneus tragula***, Report 220, on R.α21 and on Reeves and Bankier specimens (BMNH.1968.3.11.12; 7¼ inches, skin, Reeves specimen, SYNTYPE).

MONODACTYLIDAE

196. *Psettus argenteus*, Report 246, R.240.

KYPHOSIDAE

*197. ***Crenidens leoninus***, Report 242, solely on R. 263. **Pl. 5b.**
198. *Crenidens melanichthys*, Report 243, R.247.
199. *Crenidens punctatus*, Report 242, R.79.

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200. *Drepane longimana*, Report 245, R.241.
201. *Drepane punctata*, Report 244, R.51.
202. *Ephippus orbis*, Report 245, R.210.
203. *Platax ehrenbergii*, Report 245, R.103.

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204. *Diacope borensis*, Report 229, R.196.
205. *Diacope octolineata*, Report 229, R.93.
206. ***Mesoprion hoteen***, Report 229, on R.α28 and on two Reeves specimens (BMNH.1968.3.11.5–6—two skins, 12 and 6½ inches, SYNTYPES).
207. *Mesoprion unimaculatus*, Report 229, R.α25.
208. *Serranus vitta*, Report 234, R.β37.

LOBOTIDAE

*209 ***Lobotes citrinus***, Report 237, solely on R. 191. **Pl. 6a.**

GERRIDAE

210. *Gerres equula*, Report 239, R.215.
211. *Gerres punctatus*, Report 240, R.260.
212. *Gerres* sp., Report 240, R.β39.

POMADASYIDAE

213. *Diagramma cinctum*, Report 226, R.82.
214. *Diagramma gaterina*, Report 227, R.α50.
215. *Diagramma poecilopterum*, Report 227, R.190.
216. ***Diagramma punctatum***, Report 227, R.78.

217. ***Hapalogenys analis***, *Ann. Mag. nat. Hist.*, **13** : 463, Sulphur 85, pl. 43iii, Report 235, on R.91 and on Reeves specimen (apparently lost).
218. ***Hapalogenys maculatus***, Report 235, on R.α49 and on British Museum specimen (" no such specimen in the Collection "—Günther, **1** : 317).
219. ***Hapalogenys nitens***, Sulphur 84, pl. 43i and ii, Report 235, on R.92 and on Reeves specimen, model for the drawing (BMNH.1968.3.11.1—3¼ inches, HOLOTYPE).
*220. ***Pristipoma ? chloronotum***, Report 228, solely on R. 231. **Pl. 6b.**
*221. ***Pristipoma? gallinaceum***, Report 228, solely on R. β22. **Pl. 23a.**
*222. ***Pristipoma? grammopoecilium***, Report 228, solely on R. α9. **Pl. 7a.**
223. *Pristipoma japonicum*, Report 228, R.202.
224. *Pristipoma kakaan*, Report 227, R.201.
225. *Pristipoma nageb*, Report 227, R.244.
226. ***Pristipoma pihloo***, Report 227, on R.α29 and on Reeves specimen (" appears to have been mislaid "—Günther, **1** : 292).
*227. ***Scolopsides pomotis***, Report 237, solely on R. β15. **Pl. 7b.**
228. *Scolopsides ruppellii*, Report 236, R.47.
229. *Scolopsis inermis*, Report 236, R.262.

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230. *Scatophagus argus*, Report 245, R.272?
231. *Scatophagus bougainvillii*, Report 245, R.83.
232. *Scatophagus ornatus*, Report 245, R.β35.

CHAETODONTIDAE

233. *Chaetodon aureus*, Report 246, R.α23.
234. *Chaetodon modestus*, Report 246, R.β41.
235. *Chaetodon strigatus*, Report 246, R.β4.
236. *Holacanthus septentrionalis*, Report 246, R.178.

OPLEGNATHIDAE

*237 ***Hoplegnathus maculosus***, Report 247, solely on R. 270. **Pl. 23b.**
238. *Hoplegnathus punctatus*, Report 247, R.α12.

POMACENTRIDAE

*239. ***Amphiprion chrysargyrus***, Report 254, solely on R. α26. **Pl. 8a.**
240. *Glyphisodon caelestinus*, Report 253, R.256.
241. *Glyphisodon rahti*, Report 253, R.α33.
242. *Glyphisodon tyrwhitti*, Report 253, R.α31.
243. *Glyphisodon* sp., Report 253, R.274.
244. *Pomacentrus nigricans*, Report 254, R.α32.

CIRRHITIDAE

245. *Cheilodactylus zonatus*, Report 239, R.β43.
246. *Cirrhites aureus*, Report 239, R.α16.

CEPOLIDAE

*247. ***Cepola hungta***, Report 277, solely on R. β2. **Pl. 8b.**

MUGILIDAE

248. *Mugil haematocheilus*, Report 249, R.β49.
249. ***Mugil melanocranus***, Report 248, on R.73 and on Belcher fish (apparently lost).
*250. ***Mugil ventricosus***, Report 249, solely on R. β31. **Pl. 24a.**
*251. ***Mugil*** (vel ***Cestraeus***) ***xanthurus***, Report 248, solely on R. 127. **Pl. 24b.**

SPHYRAENIDAE

252. *Sphyraena chinensis*, Report 266, R.62.

POLYNEMIDAE

253. *Polynemus tetradactylus*, Report 218, R.β29, 242 (young?).
254. *Polynemus xanthonemus*, Report 219, R.α15.

LABRIDAE

255. *Cheilio inermis*, Report 258, R.100.
256. *Cossyphus bilunulatus*, Report 256, R.243.
257. ***Cossyphus cyanostolus***, Report 256, on R.251 and on two fishes in spirits (= *Choerops oligocanthus fide* Günther, **4** : 95) and a Reeves specimen (BMNH.1968.3.11.15—skin, 13½ inches, HOLOTYPE).
258. ***Cossyphus ommopterus***, Report 257, on R.98 and on Reeves specimen (BMNH. 1968.3.11.16—skin, 6 inches, HOLOTYPE).
259. ***Ctenolabrus aurigarius***, Sulphur 90, pl. 45i and ii, Report 258, on R.β24 and on Reeves specimen (BMNH.1851.12.27.170—two fishes, 5¼ and 6¼ inches, SYNTYPES).
260. ***Ctenolabrus rubellio***, Sulphur 93, pl. 45, Report 258, on R.90 and on Reeves specimen (BMNH.1968.3.11.13; 6½ inches, ? HOLOTYPE).
261. ***Julis exornatus***, Report 258, on R.β10 (pl. 3iv in Whitehead & Joysey, 1967) and on Vachell, Reeves and Bankier specimens (BMNH.1851.12.27.1634—four fishes, 5½–6½ inches, SYNTYPES).
*262. ***Julis exornatus*** var. α?, Report 259, solely on R. 258. **Pl. 24c.**
*263. ***Julis exornatus*** var. β, Report 259, solely on R. 86. **Pl. 25a.**
264. *Julis lunaris*, Report 260, R.α30.
265. ***Julis poecilopterus***, Report 260, on R.233 and on Reeves specimen (apparently lost).
*266. ***Julis thersites***, Report 260, solely on R. 208. **Pl. 25c.**
267. ***Labrus eothinus***, Report 255, on R.197 and on a Canton specimen (BMNH.1968.3. 11.14—skin, 9½ inches, HOLOTYPE).
*26 8.***Xyrichthys puniceus***, Report 261, solely on R. 184. **Pl. 9a.**

SCARIDAE

269. ***Calliodon chlorolepis***, Sulphur 137, pl. 64iv–vii, Report 263, on R.77 and on Bankier fish (BMNH.1847.5.10.14).
270. *Scarus caeruleo-punctatus*, Report 263, R.248.
271. *Scarus limbatus*, Report 262, R.α13.
272. ***Scarus pyrrostethus***, Report 262, on R.76 and on Reeves specimen (BMNH.1968. 3.11.17—skin, 13 inches, HOLOTYPE).

URANOSCOPIDAE

273. *Uranoscopus asper*, Report 211, R.162, 166.

BLENNIIDAE

*274. ***Blennius aurosplendidus***, Report 265, solely on R.0 (not in Hardwicke set, not found elsewhere).
*275. ***Blennius fasciolaticeps***, Report 265, solely on R. (no number, present in Reeves set, p. 124 as " q "). **Pl. 25c.**

CALLIONYMIDAE

276. ***Callionymus reevesii***, Sulphur 60, pl. 36i, ii and iii, Report 210, on R.180 (as pl. 36iv in Sulphur) and on Belcher specimen (apparently lost).

GOBIIDAE

277. ***Apocryptes serperaster***, Report 206, on R.β55 (pl. 3ii in Whitehead & Joysey, 1967) and on two Vachell specimens (destroyed) (BMNH.1965.8.12.51, a Reeves specimen of 6 inches labelled as type).

278. ***Boleophthalmus aucupatorius***, Sulphur 148, pl. 62i–iv, Report 208, on R.β53 and on specimens from Vachell, Reeves and Home (BMNH.1965.8.12.52–53, presented by Richardson, the larger 2·65 inches total length and probably the measured specimen—Whitehead & Joysey, 1967 : 144).

279. *Boleophthalmus boddaerti*, Report 208, R.β38.

*280. ***Boleophthalmus campylostomus***, Report 209, solely on R.β52 (note on supposed type in Whitehead & Joysey, 1967 : 144, 155). **Pl. 26a.**

*281. ***Eleotris cantherius***, Report 209, solely on R. 114. **Pl. 26b.**

282. *Gobius chinensis*, Report 204, R.f 89.

283. ***Gobius fasciato-punctatus***, Sulphur 145, pl. 62xiii–xiv, Report 204, on R.146 and on Vachell and Reeves specimens (BMNH.1968.3.11.18; 6¼ inches, HOLOTYPE).

284. *Gobius filifer*, Report 205, R.276.

285. ***Gobius ommaturus***, Sulphur 146, pl. 55i–iii, Report 205, on R.147 and on Canton and Woosung specimens (original specimens appear to be lost).

286. ***Gobius platycephalus***, Report 204, on R.194 and on Vachell fish (destroyed—Whitehead & Joysey, 1967).

287. *Philypnus sinensis*, Report 210, R.β8.

288. ***Amblyopus rugosus***, Report 207, on R.β7 and on Vachell fishes (destroyed—Whitehead & Joysey, 1967).

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289. *Trypauchen vagina*, Report 206, R.β57.

ACANTHURIDAE

290. *Amplacanthus fuscescens*, Report 243, R.115.

291. *Amplacanthus margaritiferus*, Report 243, R.259.

292. *Prionurus scalprum*, Report 244, R.183.

TRICHIURIDAE

293. *Trichiurus armatus*, Report 268, R.β56.

SCOMBRIDAE

294. *Cybium chinense*, Report 268, R.α52.

295. *Cybium commersonii*, Report 268, R.228.

296. *Cybium guttatum*, Report 268, R.β46.

297. ?*Cybium mertensii*, Report 268, R.216.

298. *Scomber delphinalis*, Report 267, R.β23.

299. *Scomber scombrus*, Report 267, R.163.

NOMEIDAE

300. ***Trachinotus melo***, Report 270, on R.97 (pl. 1iii in Whitehead & Joysey, 1967) and on Vachell specimen (destroyed).

STROMATEIDAE

301. *Stromateus argenteus*, Report 272, R.β32.

PSETTODIDAE

302. ***Hippoglossus dentex***, Sulphur 102, pl. 47, Report 278, on R. 195 and on Vachell and other specimens (apparently lost).
*303. ***Hippoglossus goniographicus***, Report 279, solely on R. 254. **Pl. 26c.**
*304. ***Hippoglossus orthohynchus***, Report 278, solely on R. 106. **Pl. 27a.**

BOTHIDAE

*305. ***Platessa balteata***, Report 278, solely on R. 205. **Pl. 9b.**
306. *Platessa chinensis*, Report 277, R. 107a and b.
*307. ***Platessa chinensis*** var. ***caeruleo-oculea***, Report 277, solely on R. 204. **Pl. 10a.**
308. *Platessa chrysoptera*, Report 278, R. 104.
*309. ***Platessa velafracta***, Report 278, solely on R. 105. **Pl. 27b.**

PLEURONECTIDAE

310. *Samaris cristatus*, Report 279, R. 171.

SOLEIDAE

*311. ***Solea foliacea***, Report 279, solely on R. β5 and h 91. **Pl. 28a.**
312. ***Solea ommatura***, Report 279, on R. β13 (pl. 1iv in Whitehead & Joysey, 1967) and on two Vachell fishes (destroyed).
*313. ***Solea ovalis***, Report 279, solely on R. 179. **Pl. 10b.**

CYNOGLOSSIDAE

314. *Plagiusa abbreviata*, Report 280, R. β17.
*315. ***Plagiusa auro-limbata***, Report 280, solely on R. 151. **Pl. 28b.**
*316. ***Plagiusa favosquamis***, Report 281, solely on R. β50. **Pl. 28c.**
*317. ***Plagiusa melamptela***, Report 281, solely on R. 150. **Pl. 29a.**
*318. ***Plagiusa nigro-labeculata***, Report 280, solely on R. 152. **Pl. 29b.**
*319. ***Plagiusa puncitecps***, Report 280, solely on R. m 95 (p. 124 in Reeves copy). **Pl. 29c.**

TRIACANTHIDAE

320. *Triacanthus biaculeatus*, Report 202, R. α24.

BALISTIDAE

321. *Aleuteres berardi*, Report 202, R. 173.
322. *Balistes albo-caudatus*, Report 201, R. 265.
323. *Balistes conspicillum*, Report 201, R. 285.
324. *Balistes frenatus*, Report 201, R. 229.
*325. ***Balistes hihpe***, Sulphur 127, Report 200, solely on R. α35 (as pl. 60ii in Sulphur).
326. *Monacanthus bifilamentosus*, Report 201, R. 266.
327. *Monacanthus chinensis*, Report 201, R. 89.
328. *Monacanthus japonicus*, Report 201, R. 275.

OSTRACIONTIDAE

329. *Ostracion cornutus*, Report 200, R. (no number).

TETRAODONTIDAE

*330. ***Tetrodon laterna***, Sulphur 124, Report 199, solely on R. 99 (as pl. 61iii in Sulphur).
331. *Tetrodon ocellatus*, Report 199, R. 271.
332. ***Tetrodon ocellatus var. guttulatus***, Sulphur 121, pl. 58iii, Report 199, on R. 96 o and on Reeves specimen (BMNH. 1968. 3. 11. 20—3½ inches, too large to be the holotype).

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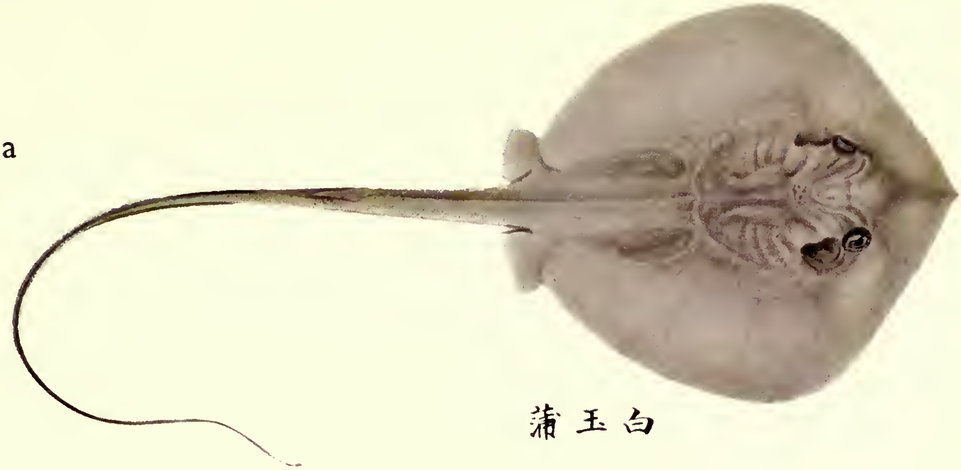
PLATE I

a. *Trygon carnea* Rich. (Reeves No. 226), 280 mm. tot. l. (No. 15 in list).

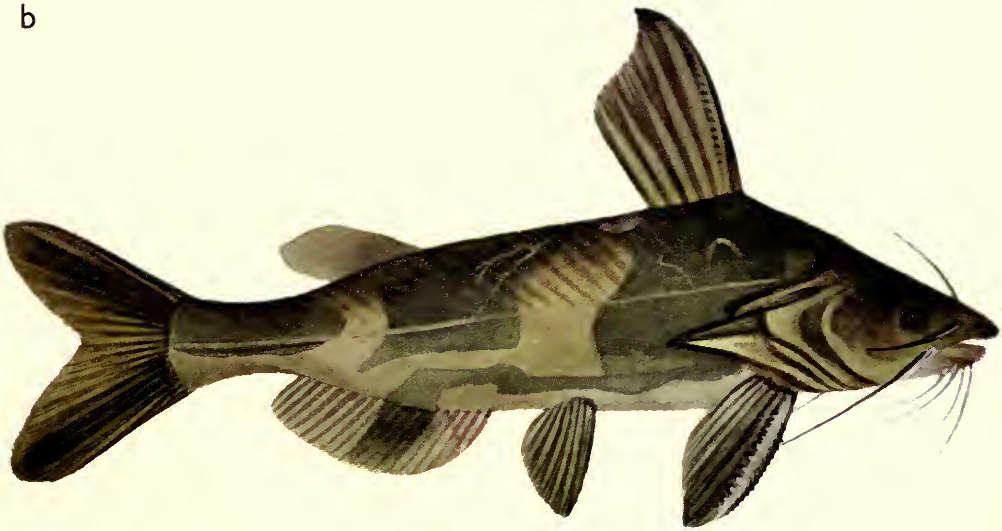
b. *Pimelodus fulvi-draco* Rich. (Reeves No. 155), 136 mm. tot. l. (No. 86 in list).

a



白玉蒲

b



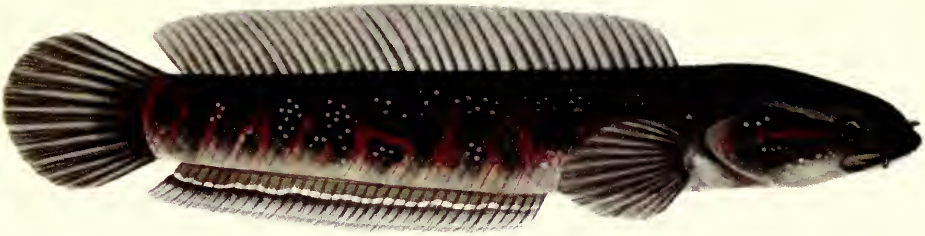
黄龍

PLATE 2

a. *Ophicephalus jovis* Rich. (Reeves No. 143), 149 mm. tot. l. (No. 103 in list).

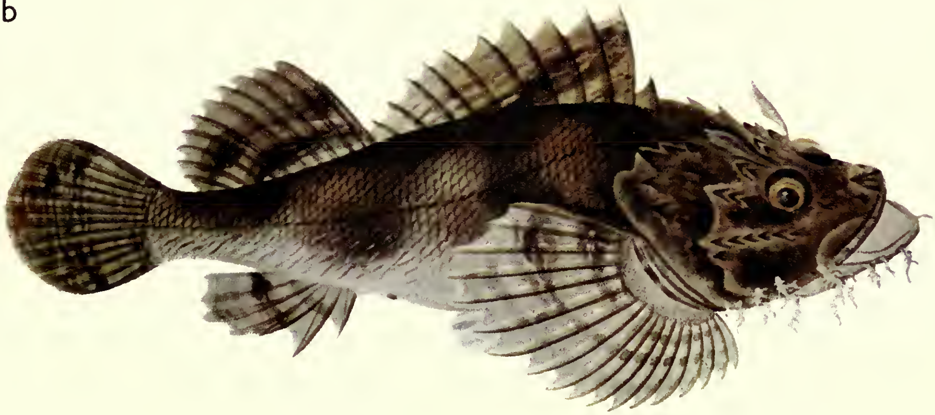
b. *Scorpaena leonina* Rich. (Reeves No. 66), 224 mm. tot. l. (No. 111 in list).

a



雷公魚

b



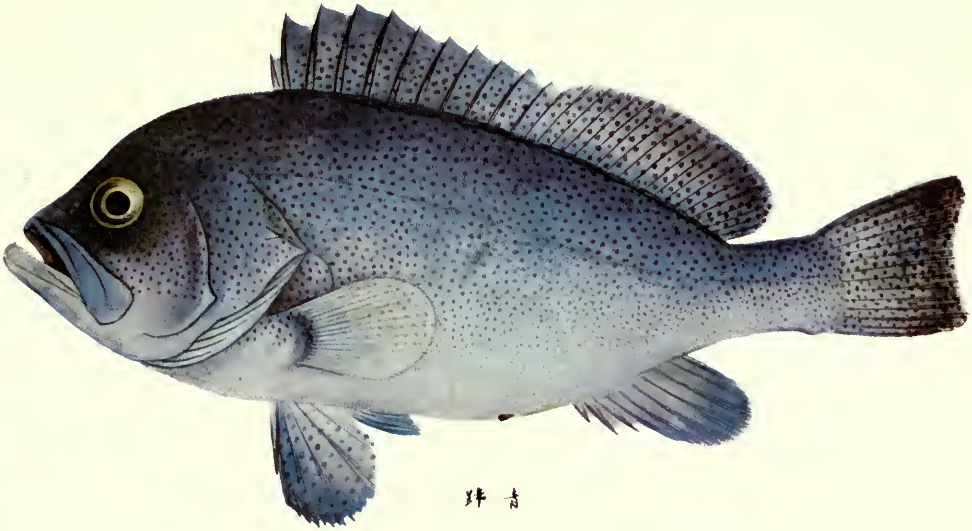
石獅子

PLATE 3

a. *Serranus cyanopodus* Rich. (Reeves No. 249), 259 mm. tot. l. (No. 128 in list).

b. *Serranus reevesii* Rich. (Reeves No. 211), 263 mm. tot. l. (No. 134 in list).

a



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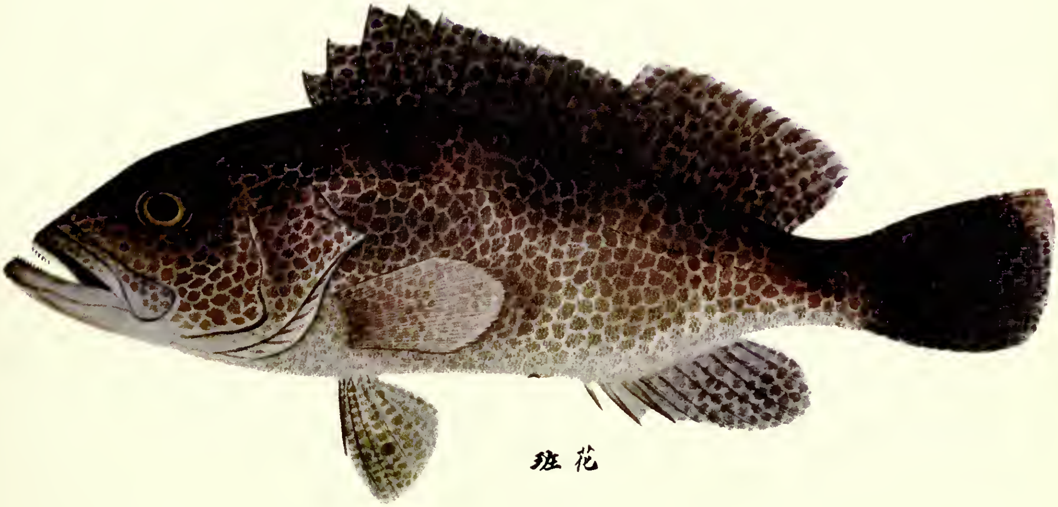
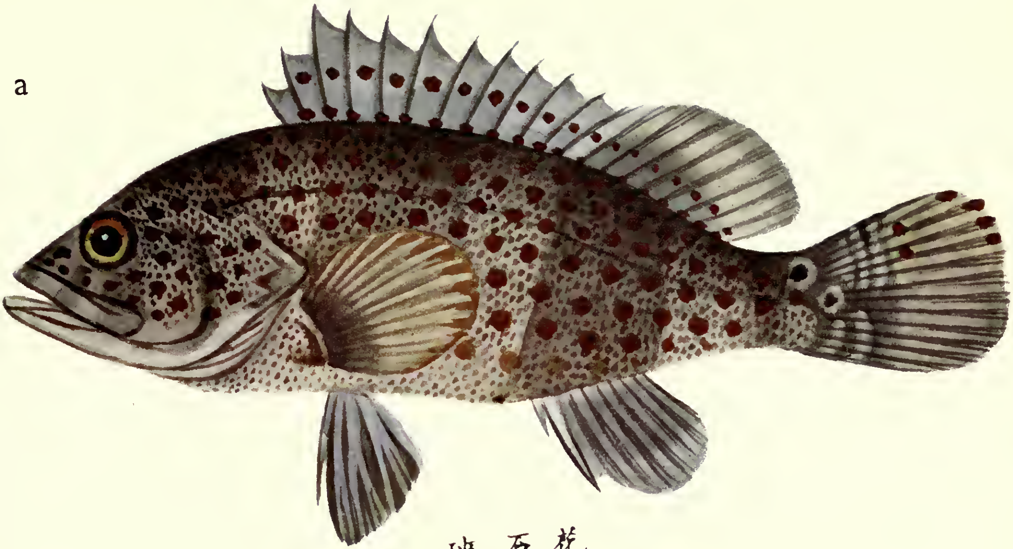


PLATE 4

a Serranus variegatus Rich. (Reeves No. 87), 144 mm. tot. l. (No. 137 in list).

b. *Caranx cestus* Rich. (Reeves No. α39), 246 mm. tot. l. (No. 152 in list).

a



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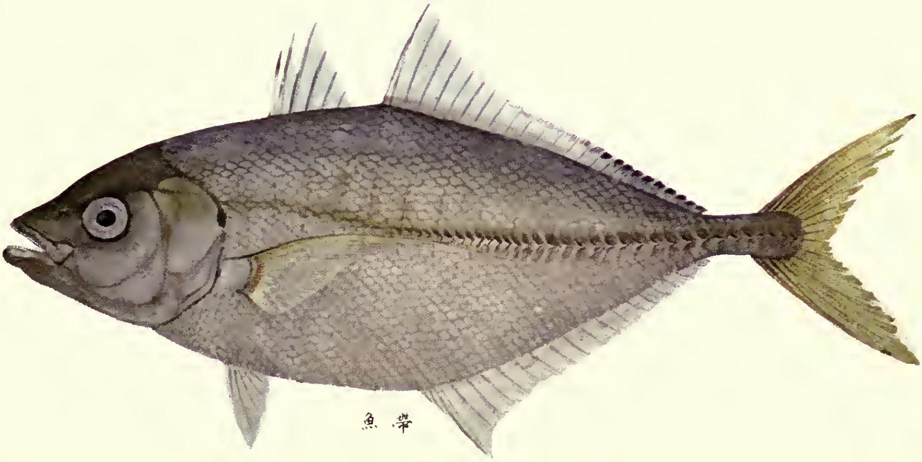
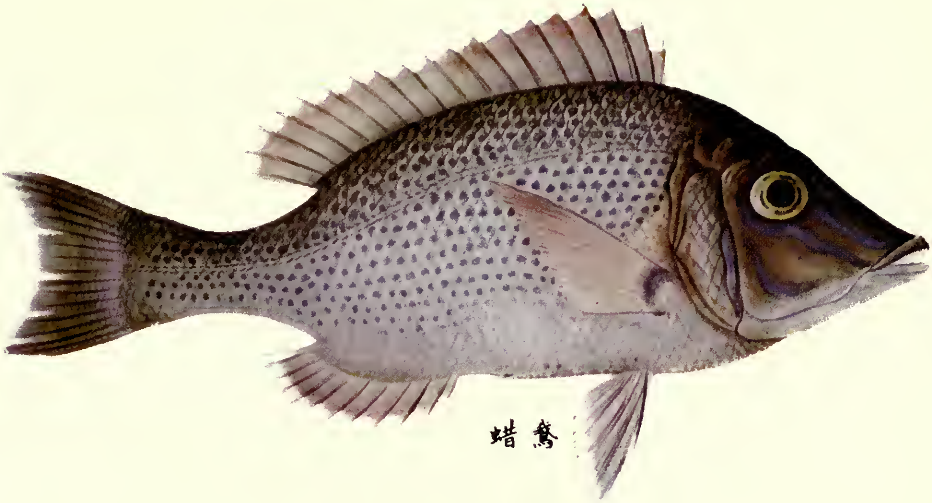


PLATE 5

a. *Lethrinus anatarius* Rich. (Reeves No. 245), 233 mm. tot. l. (No. 176 in list).

b. *Crenidens leoninus* Rich. (Reeves No. 263), 362 mm. tot. l. (No. 197 in list).

a



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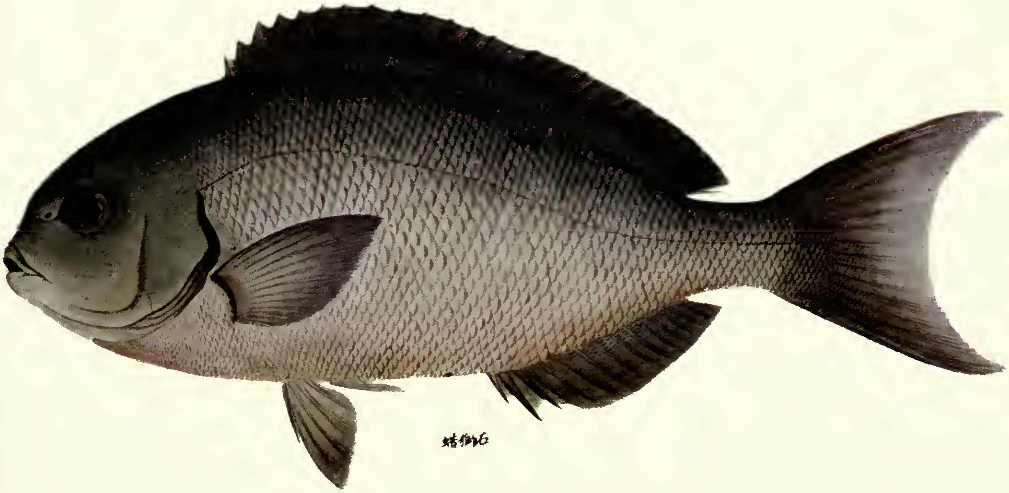
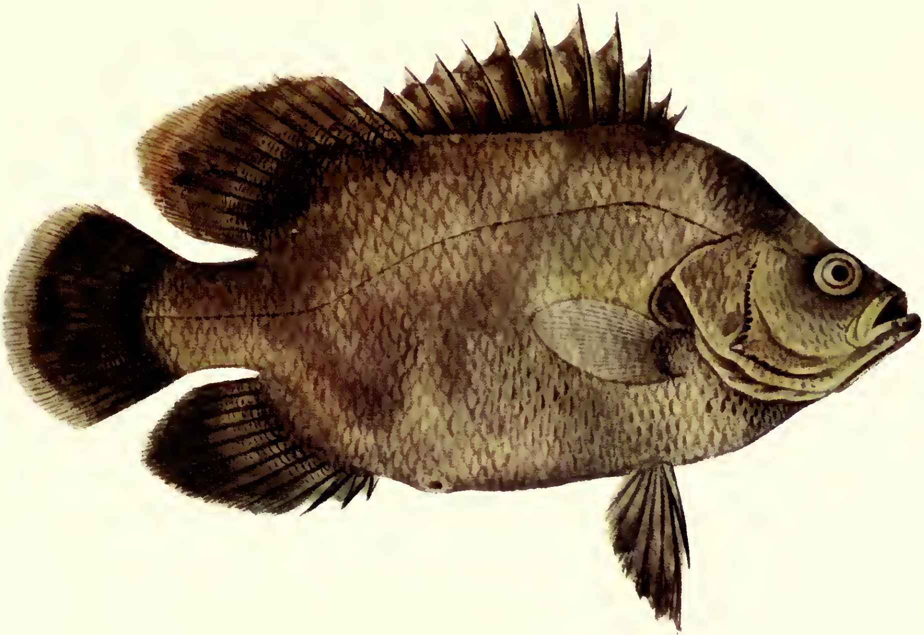


PLATE 6

a. *Lobotes citrinus* Rich. (Reeves No. 191), 161 mm. tot. l. (No. 209 in list).

b. *Pristipoma chloronotum* Rich. (Reeves No. 231), 350 mm. tot. l. (No. 220 in list).

a



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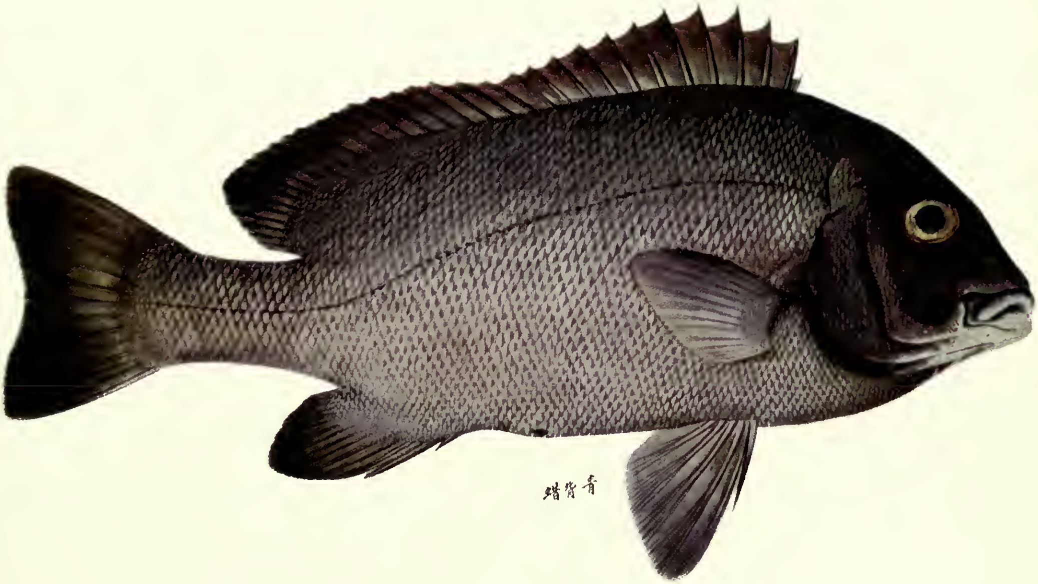
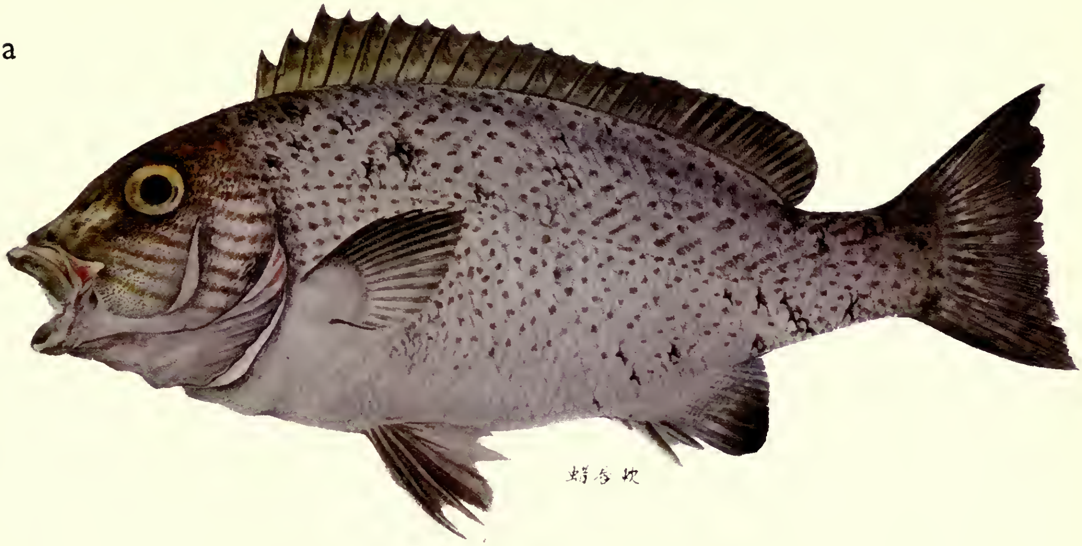


PLATE 7

a. *Pristipoma grammopoecilium* Rich. (Reeves No. α9), 351 mm. tot. l. (No. 222 in list).

b. *Scolopsides pomotis* Rich. (Reeves No. β15), 166 mm. tot. l. (No. 227 in list).

a



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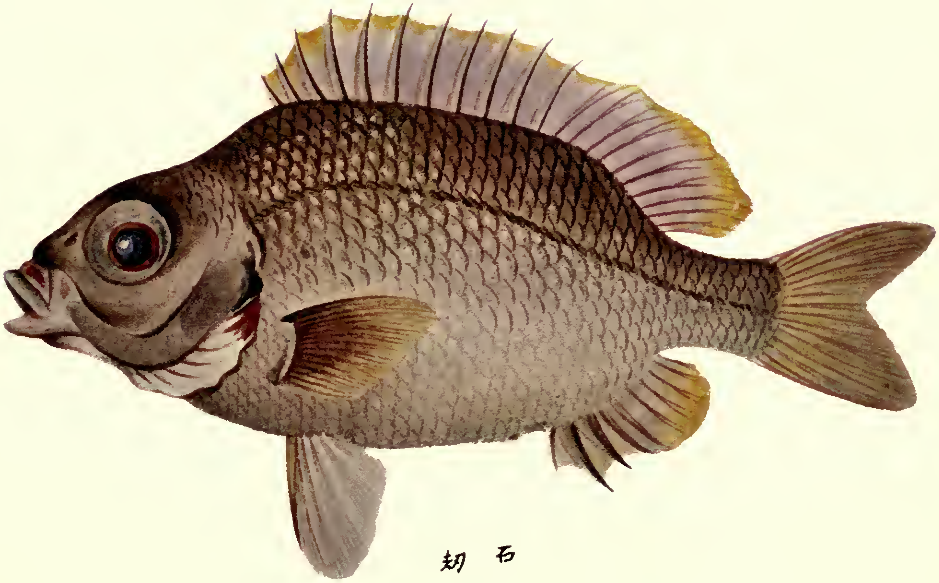
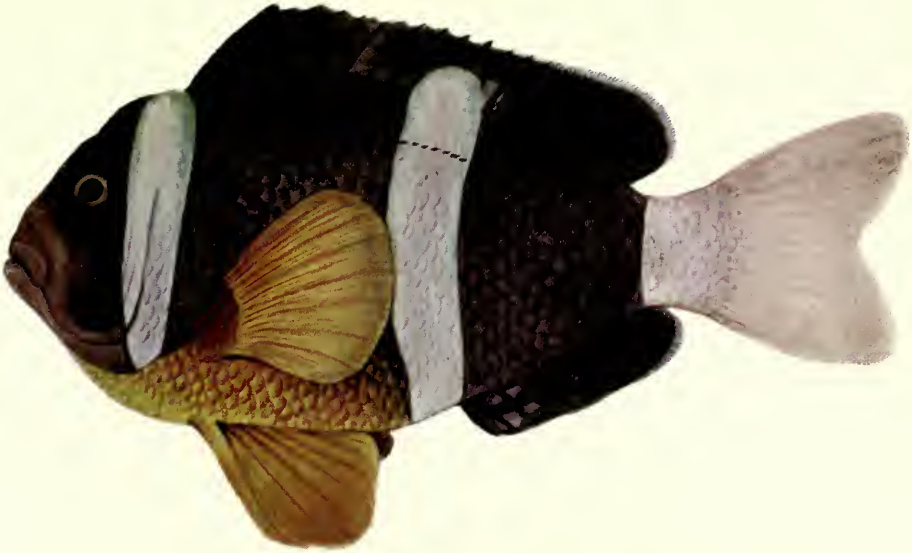


PLATE 8

a. *Amphiprion chrysargyrus* Rich. (Reeves No. α26), 108 mm. tot. l. (No. 239 in list).

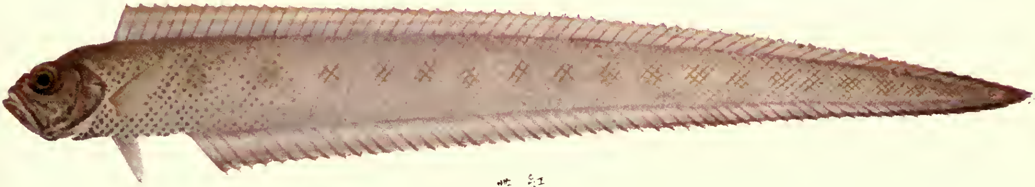
b. *Cepola hungta* Rich. (Reeves No. β2), 306 mm. tot. l. (No. 247 in list).

a



海金魚

b



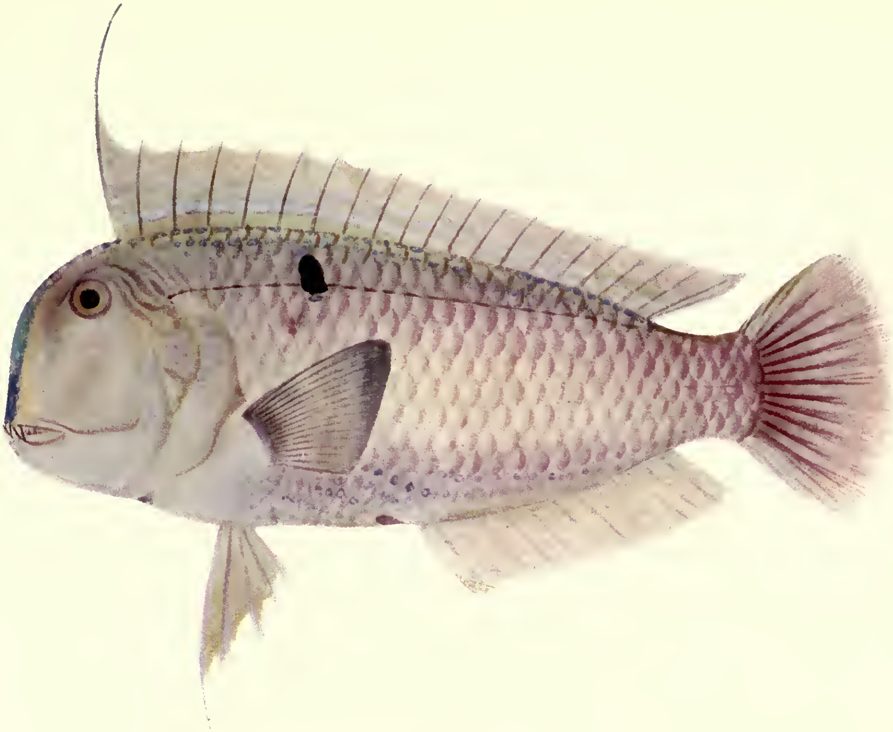
紅帶

PLATE 9

a. *Xyrichthys puniceus* Rich. (Reeves No. 184), 196 mm. tot. l. (No. 268 in list).

b. *Platessa balteata* Rich. (Reeves No. 205), 194 mm. tot. l. (No. 305 in list).

a



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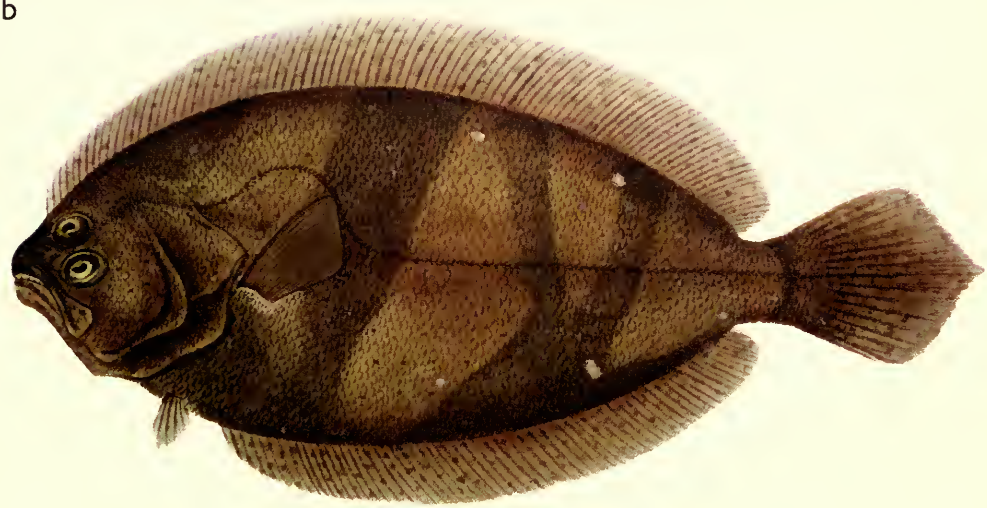


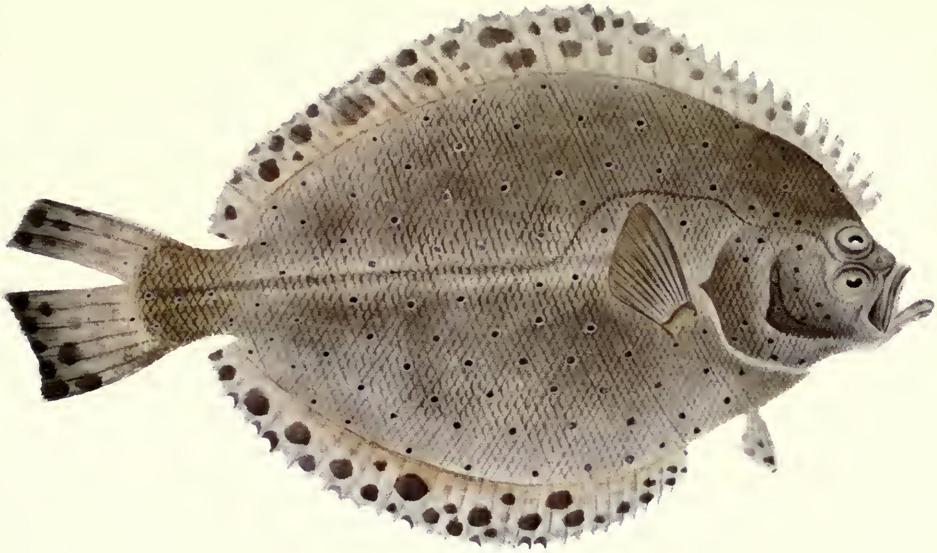
篷破

PLATE 10

a. *Platessa chinensis* var. *caeruleo-oculea* Rich. (Reeves No. 204), 278 mm. tot. l. (No. 307 in list).

b. *Solea ovalis* Rich. (Reeves No. 179), 205 mm. tot. l. (No. 313 in list).

a



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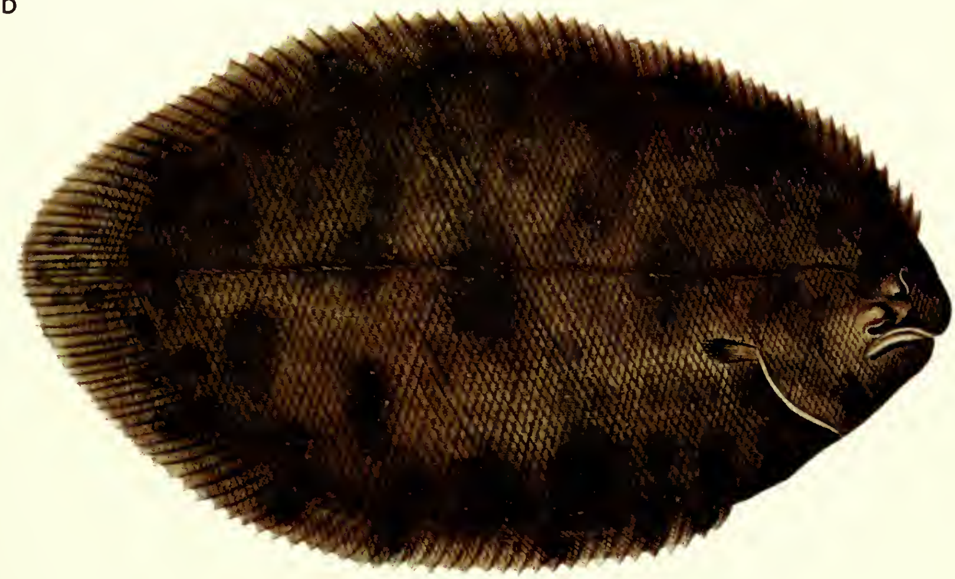


跳板魚　拈葉仔

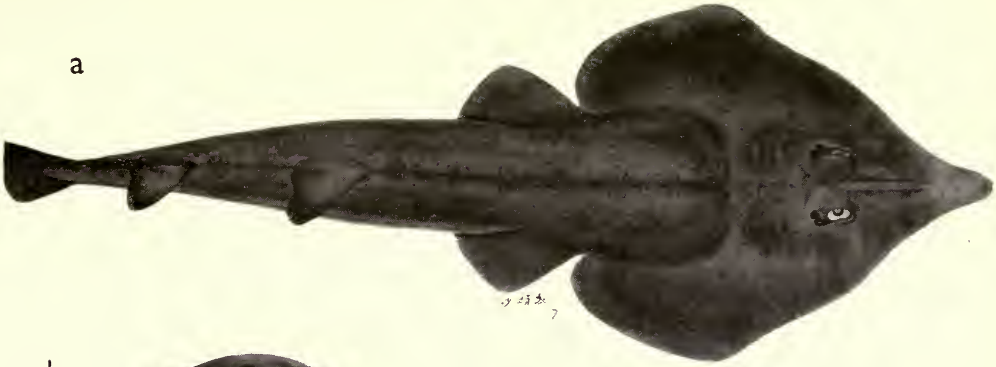
PLATE 11

a. *Rhinobatus hynnicephalus* Rich. (Reeves No. α7), 492 + mm. tot. l. (No. 9 in list).

b. *Narcine lingula* Rich. (Reeves No. 227), 328 mm. tot. l. (No. 11 in list).

c. *Myliobatis oculeus* Rich. (Reeves No. 281), *ca* 590 mm. tot. l. (No. 20 in list).

a



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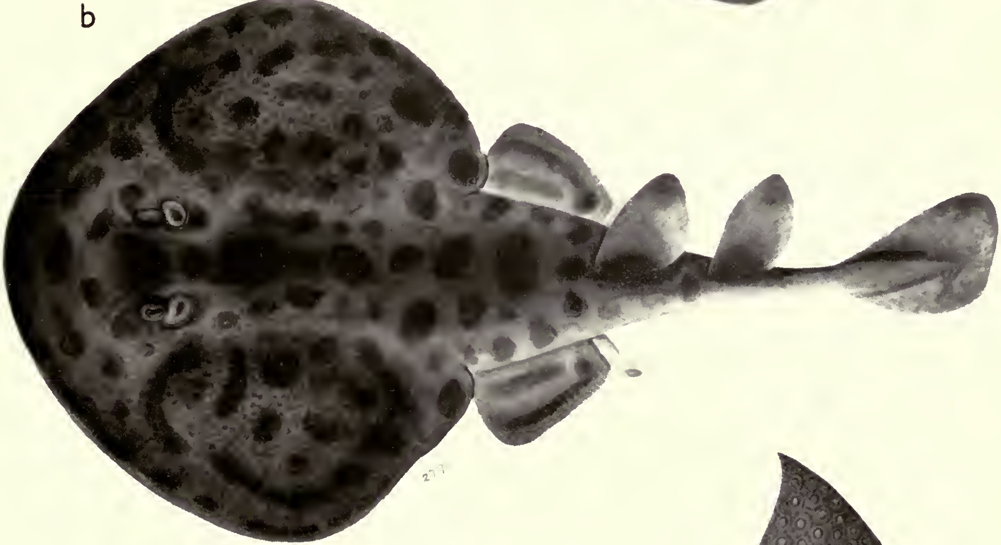

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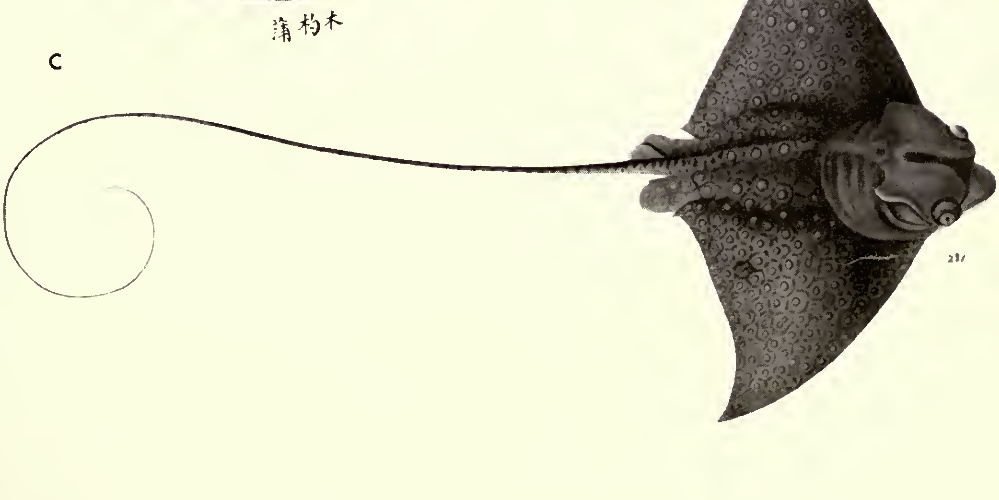


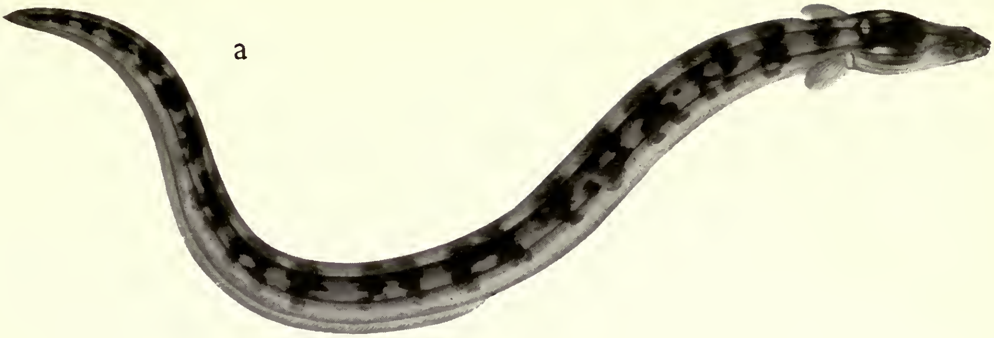
PLATE 12

a. *Congrus fasciatus* Rich. (Reeves No. 284), 577 mm. tot. l. (No. 32 in list).

b. *Saurus argyrophanes* Rich. (Reeves No. β15), 255 mm. tot. l. (No. 49 in list).

c. *Abramis terminalis* Rich. (Reeves No. 80), 229 mm. tot. l. (No. 54 in list).

a



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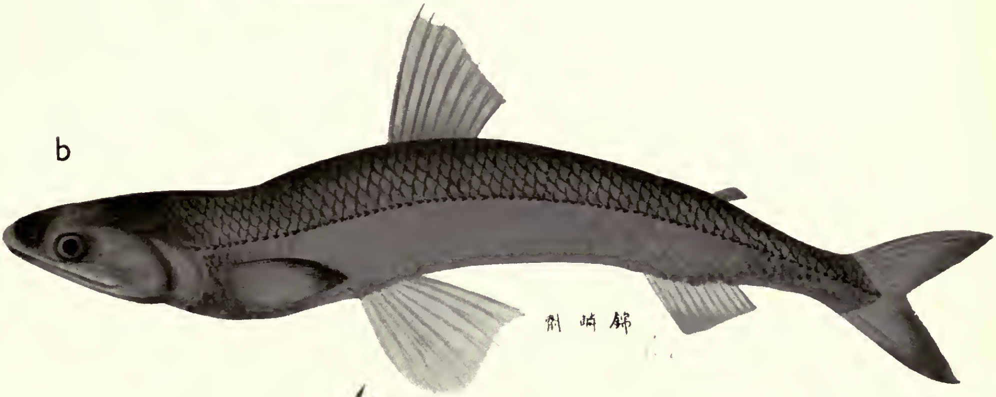

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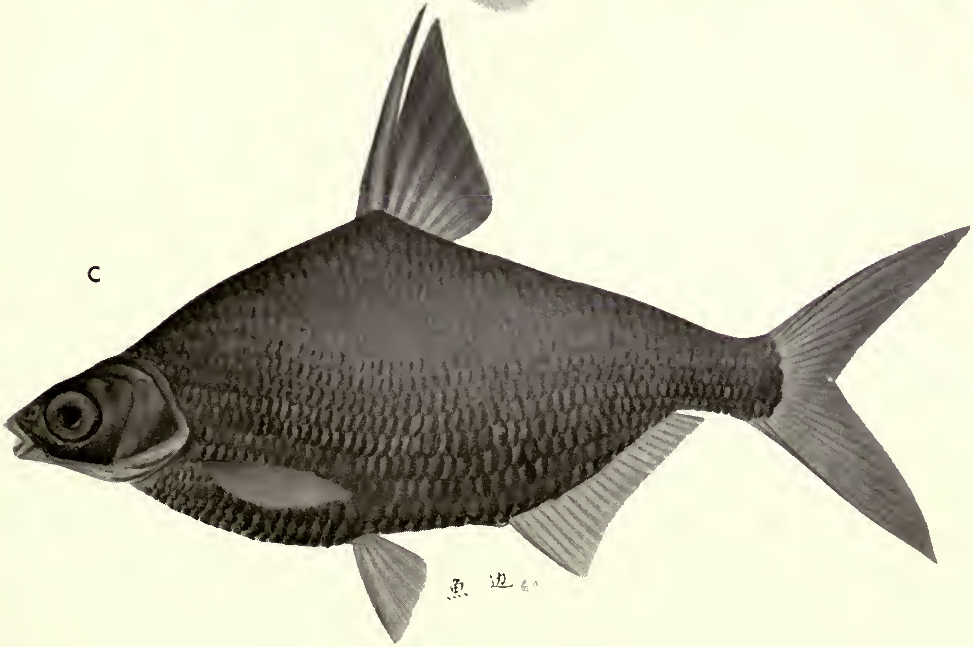
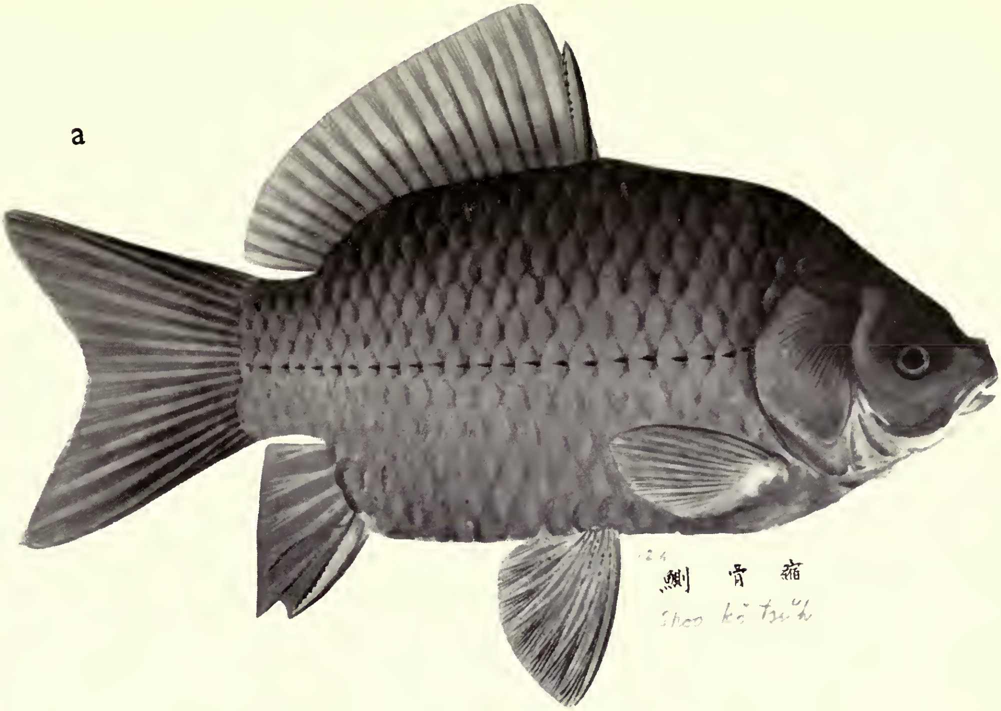


PLATE 13

a. *Cyprinus abbreviatus* Rich. (Reeves No. 124), 204 mm. tot. l. (No. 56 in list).

b. *Cyprinus acuminatus* Rich. (Reeves No. 125), 250 mm. tot. l. (No. 57 in list).

a



124
縮骨鯽
Shoo kō tsu'h

b

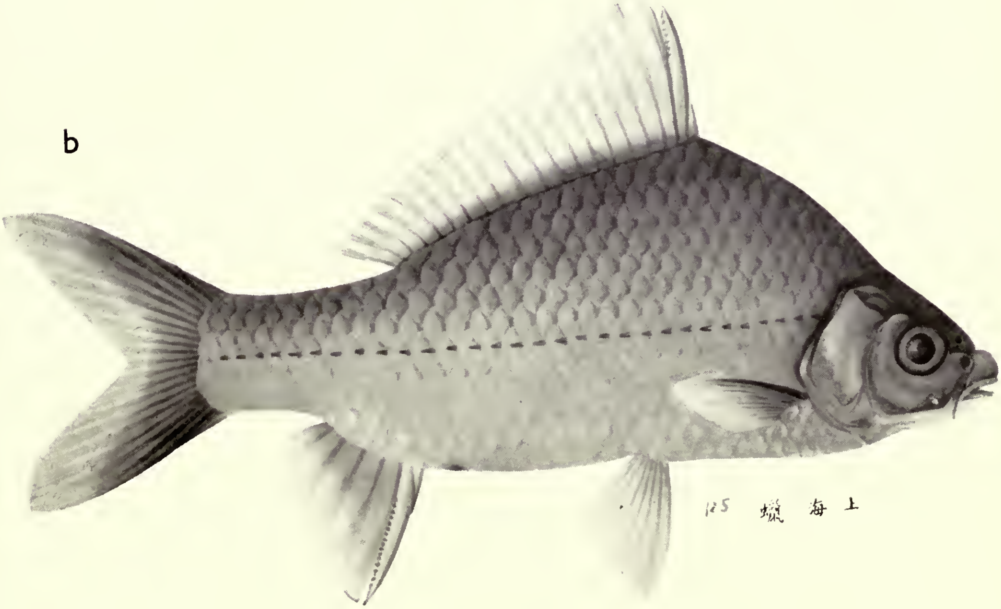
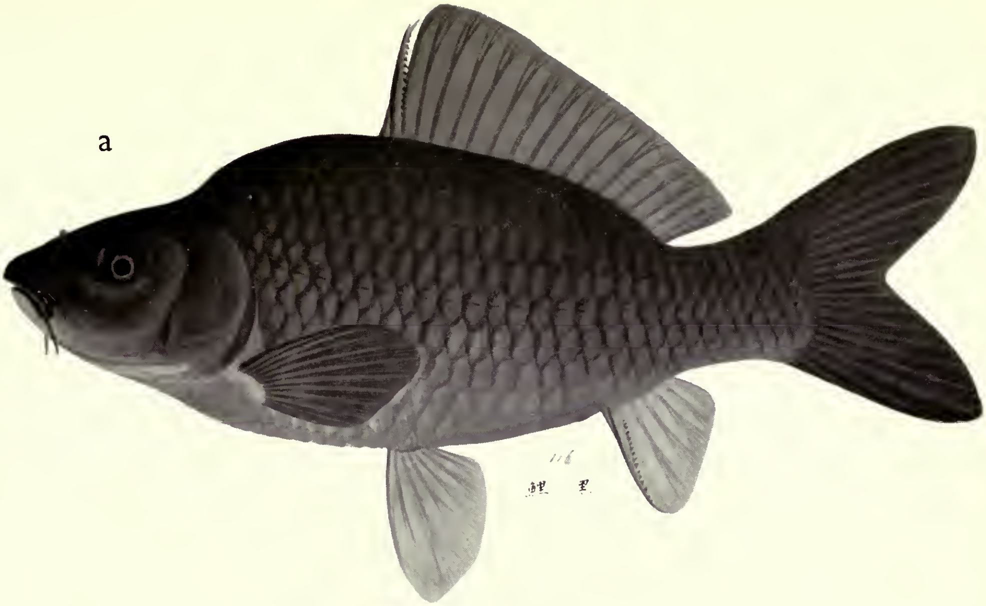


PLATE 14

a. *Cyprinus atro-virens* Rich. (Reeves No. 116), 293 mm. tot. l. (No. 58 in list).

b. *Cyprinus carassoides* Rich. (Reeves No. 126), 243 mm. tot. l. (No. 60 in list).

a



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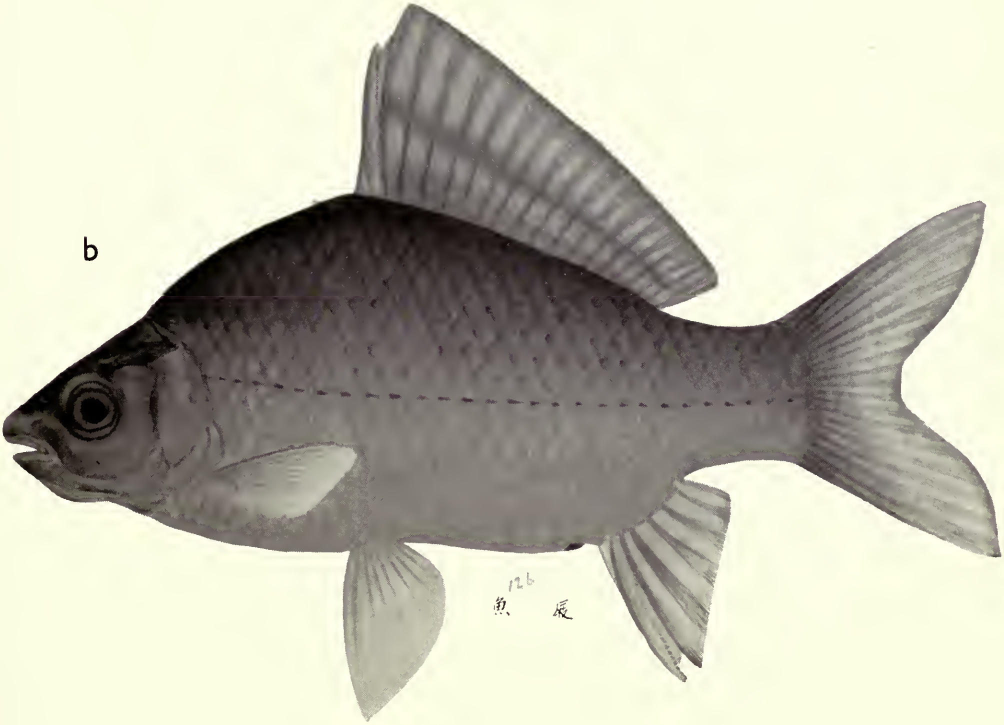
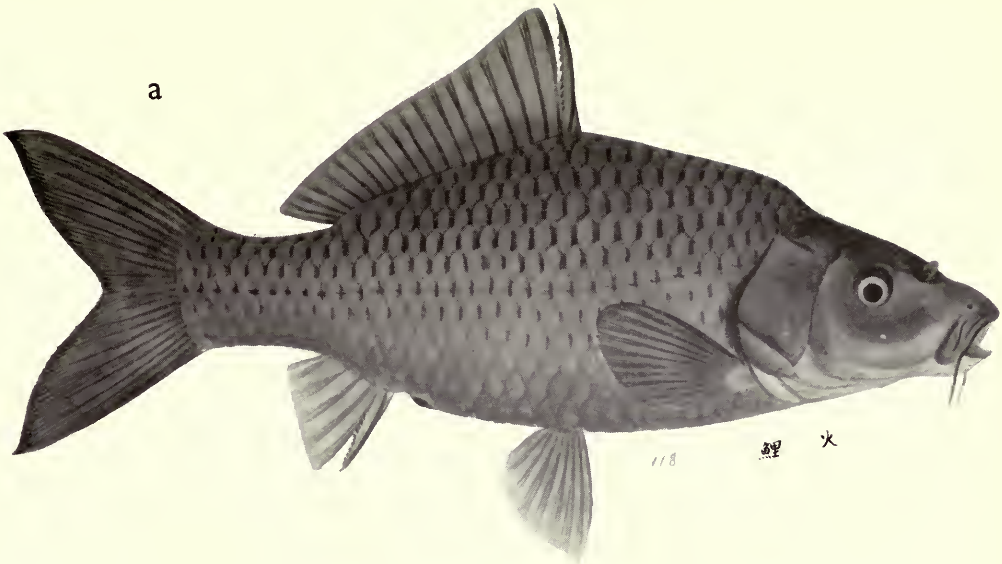


PLATE 15

a. *Cyprinus flammans* Rich. (Reeves No. 118), 264 mm. tot. l. (No. 61 in list).

b. *Cyprinus fossicola* Rich. (Reeves No. α40), 205 mm. tot. l. (No. 62 in list).

a



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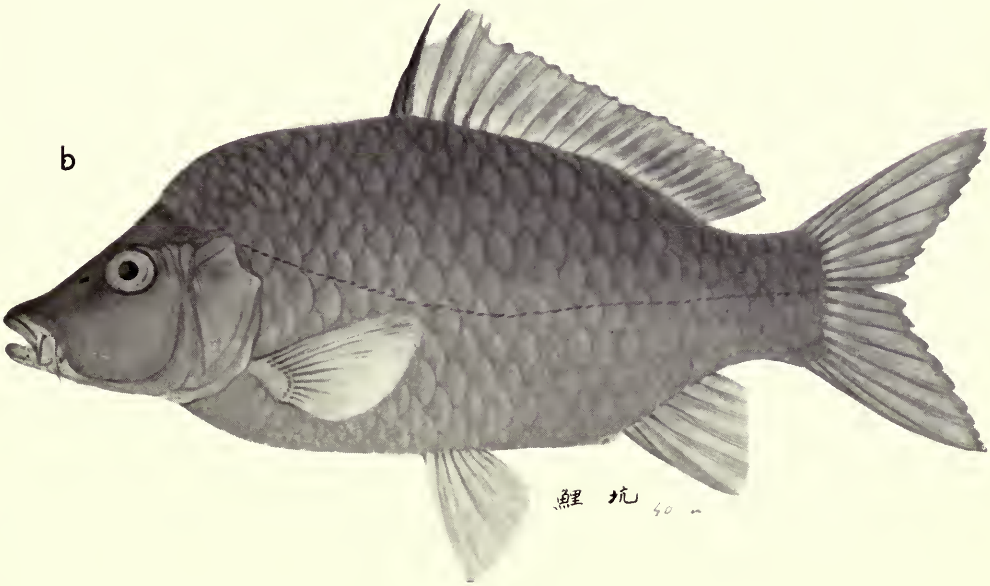
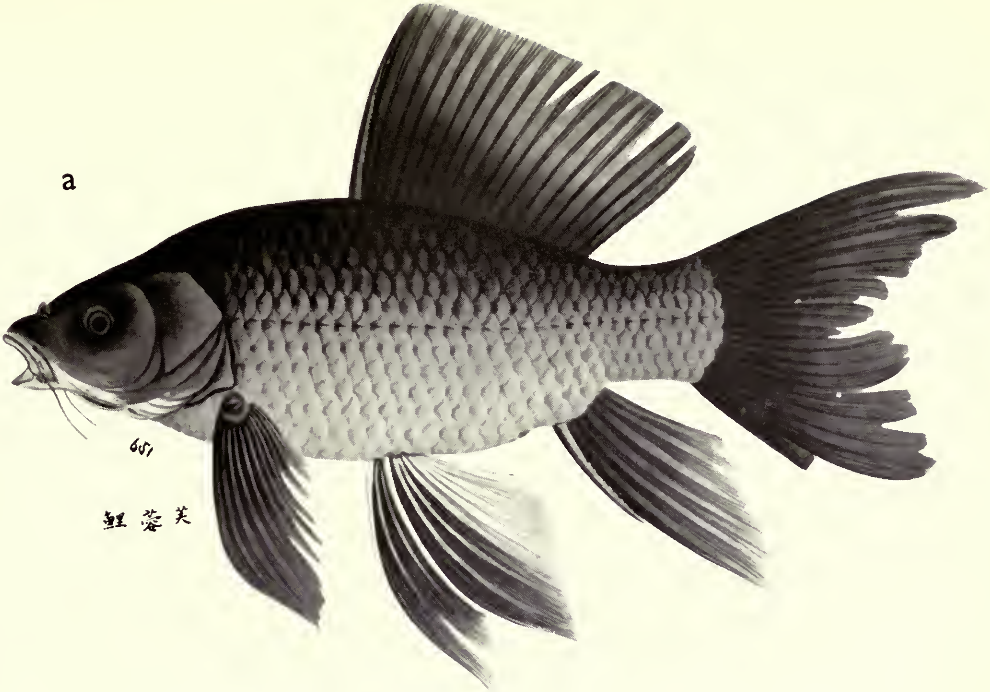


PLATE 16

a. *Cyprinus hybiscoides* Rich. (Reeves No. 156), 327 mm. tot. l. (No. 64 in list).

b. *Cyprinus sculpeonatus* Rich. (Reeves No. 120), 229 mm. tot. l. (No. 67 in list).

a



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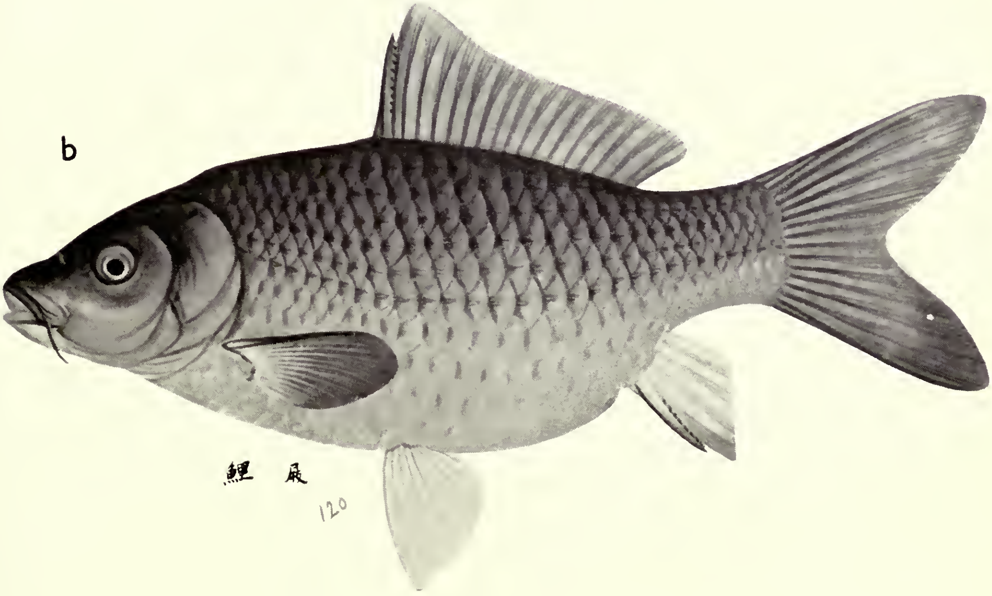


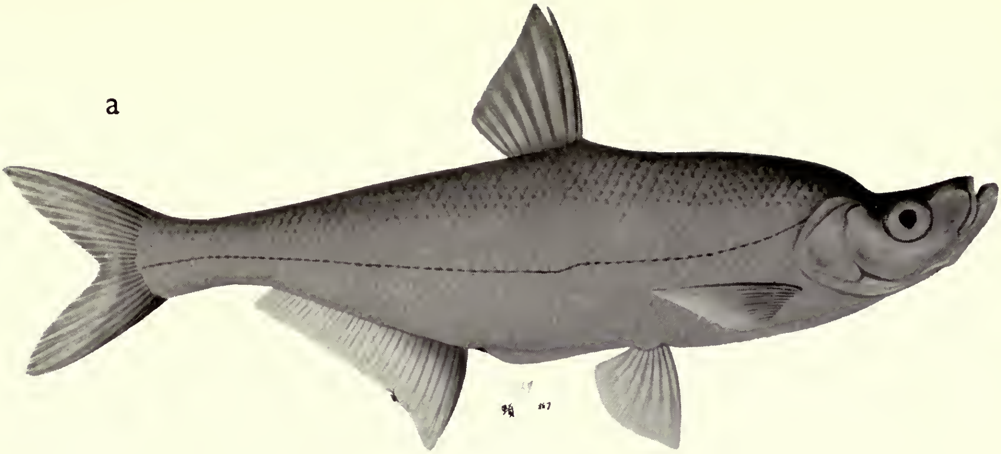
PLATE 17

a. *Leuciscus recurviceps* Rich. (Reeves No. 149), 398 mm. tot. l. (No. 72 in list).

b. *Leuciscus hemistictus* Rich. (Reeves No. 133), 378 mm. tot. l. (No. 73 in list).

c. *Leuciscus homospilotus* Rich. (Reeves No. α20), 258 mm. tot. l. (No. 74 mm. in list).

a



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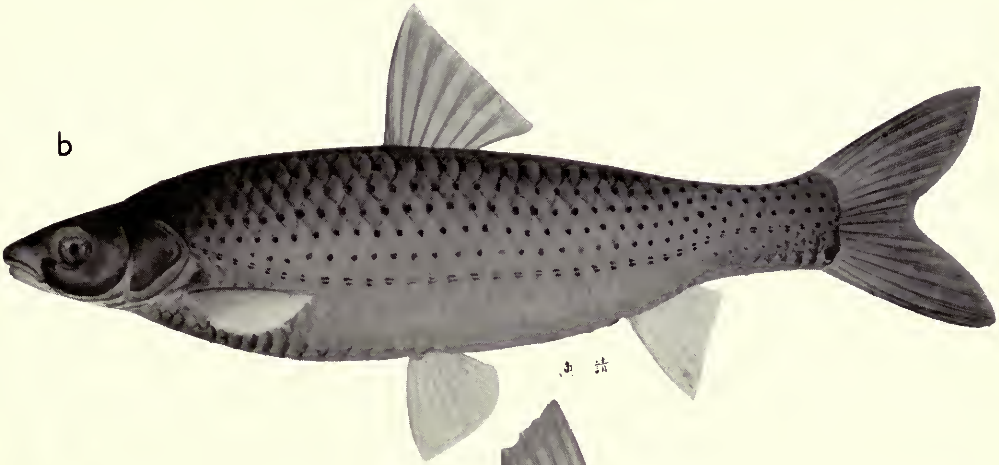

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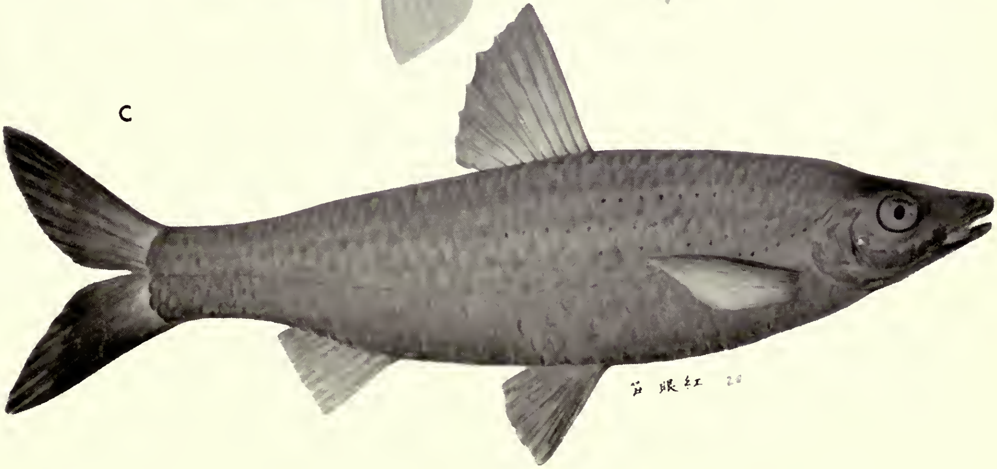


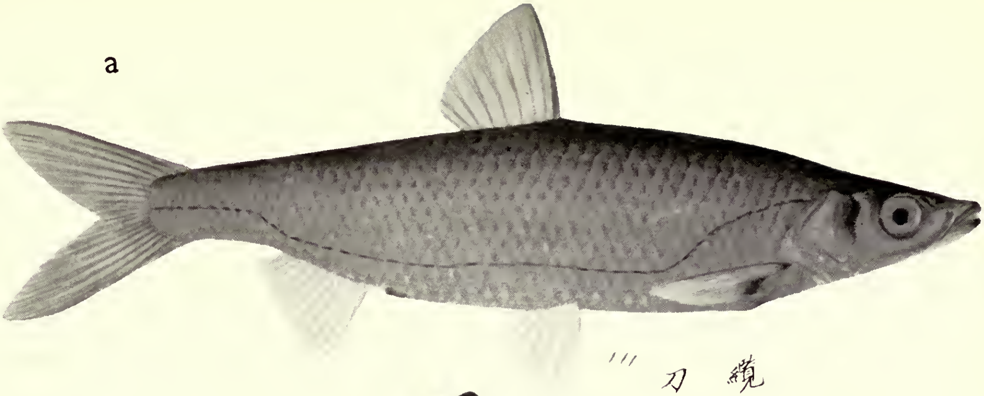
PLATE 18

a. *Leuciscus machaeroides* Rich. (Reeves No. 111), 183 mm. tot. l. (No. 76 in list).

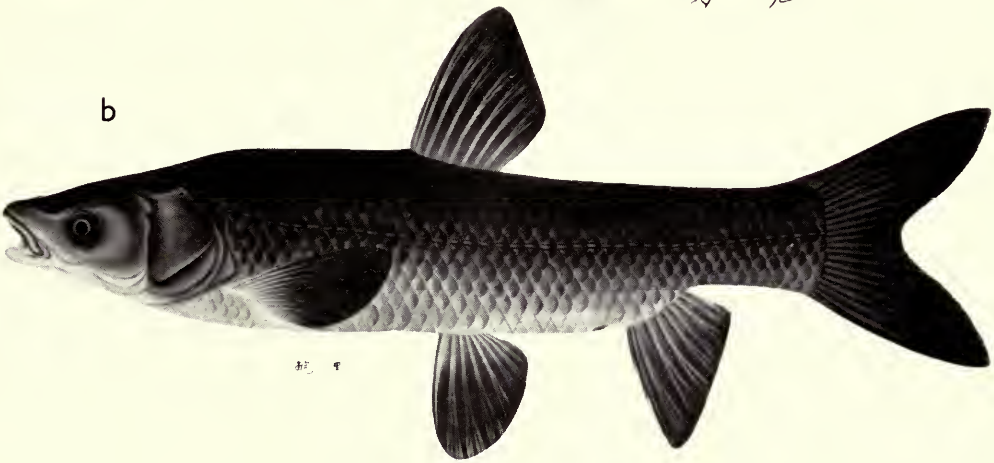
b. *Leuciscus piceus* Rich. (Reeves No. 153), 397 mm. tot. l. (No. 80 in list).

c. *Leuciscus xanthurus* Rich. (Reeves No. 112), 287 mm. tot. l. (No. 81 in list).

a



b



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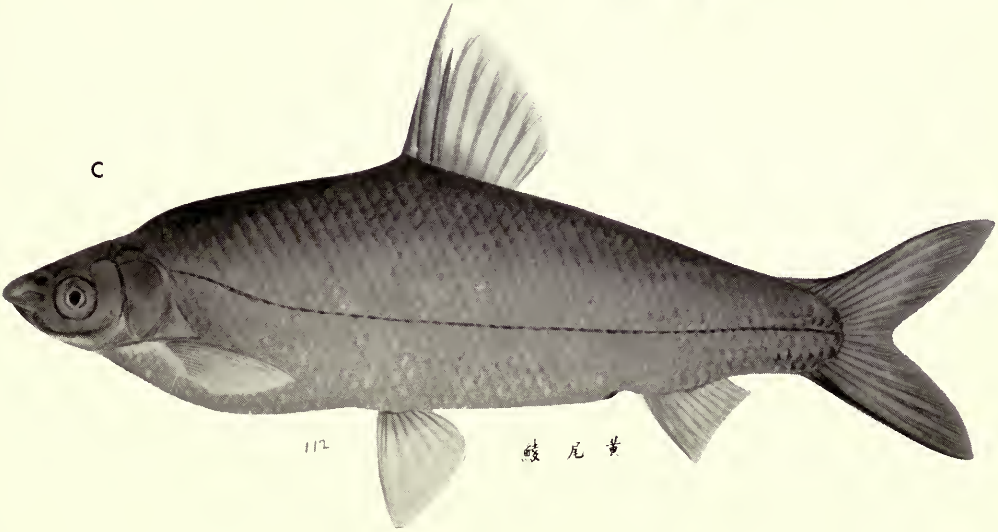


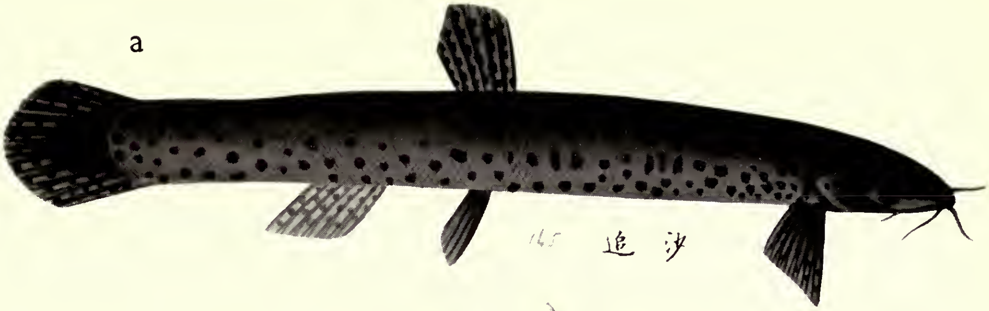
PLATE 19

a. *Cobitis psammismus* Rich. (Reeves No. 145), 181 mm. tot. l. (No. 83 in list).

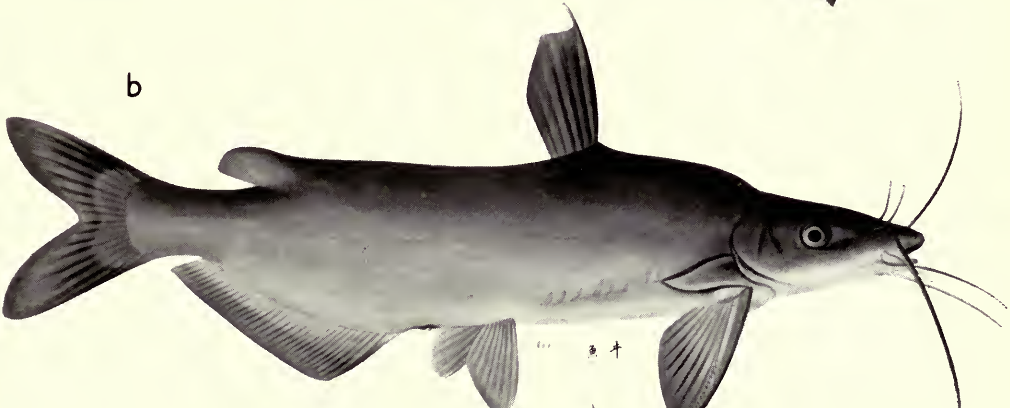
b. *Bagrus* (*Pimelodus*?) *bouderius* Rich. (Reeves No. 203), 413 mm. tot. l. (No. 85 in list).

c. *Bagrus crinalis* Rich. (Reeves No. 217), 256 mm. tot. l. (No. 91 in list).

a



b



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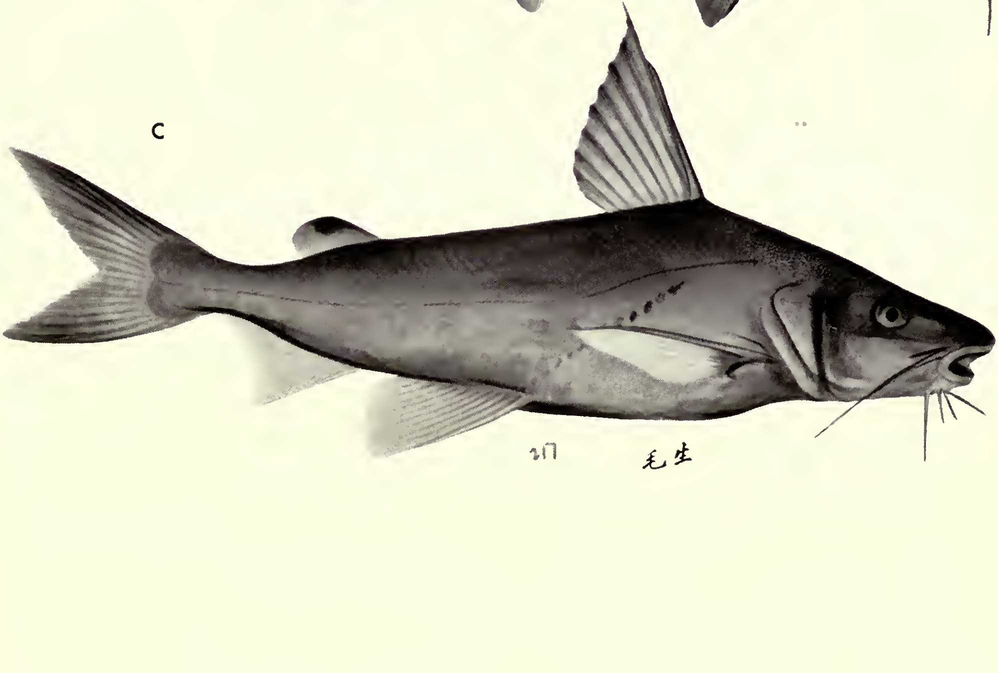


PLATE 20

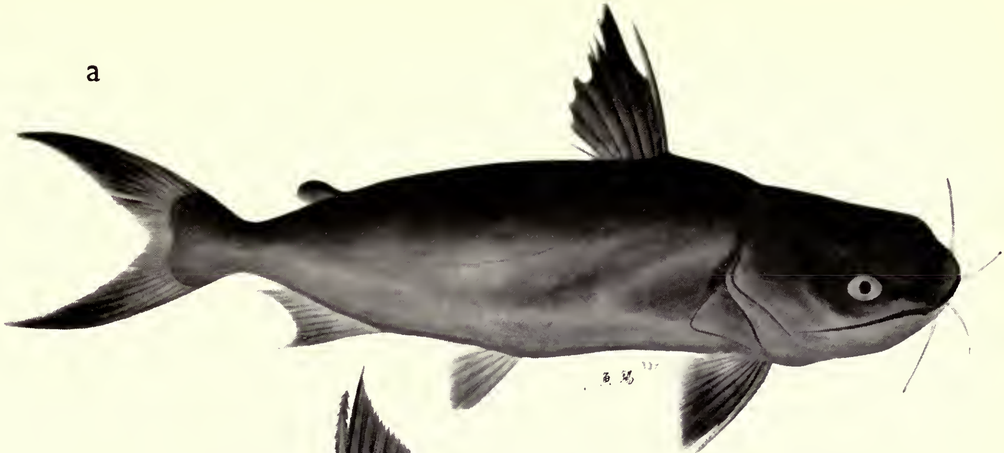
a. *Galeichthys stanneus* Rich. (Reeves No. 238), 381 mm. tot. l. (No. 92 in list).

b. *Pimelodus mong* Rich. (Reeves No. β20), 141 mm. tot. l. (No. 93 in list).

c. *Ophicephalus puticola* Rich. (Reeves No. 142), 234 mm. tot. l. (No. 105 in list).

d. *Monopterus helvolus* Rich. (Reeves, p. 124 s; Hardwicke No. 312), 226 mm. tot. l. (No. 106 in list).

a



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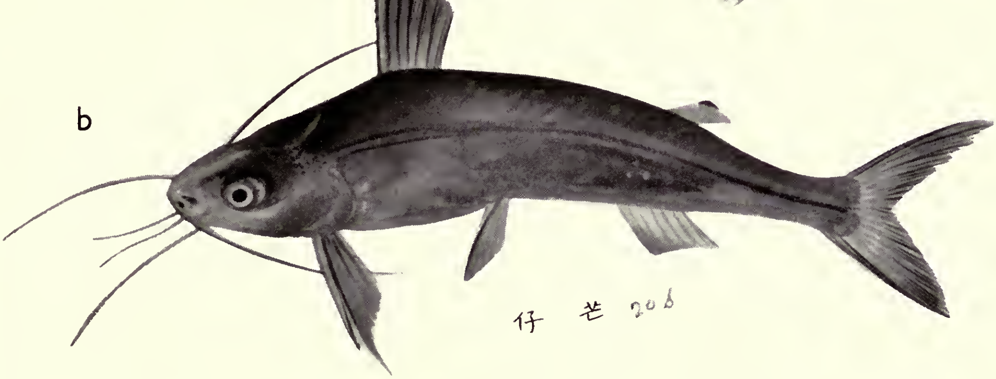

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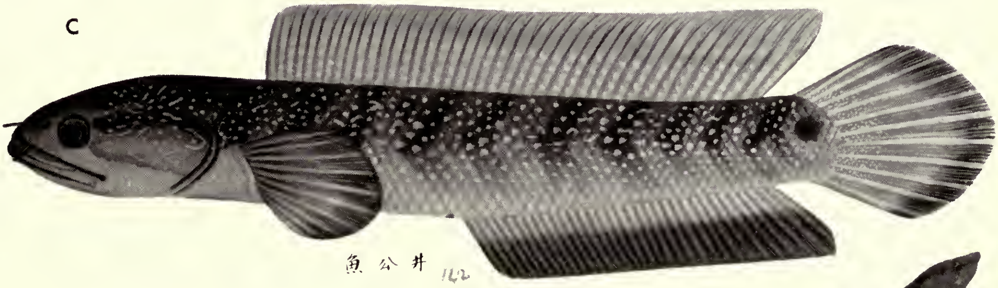


d

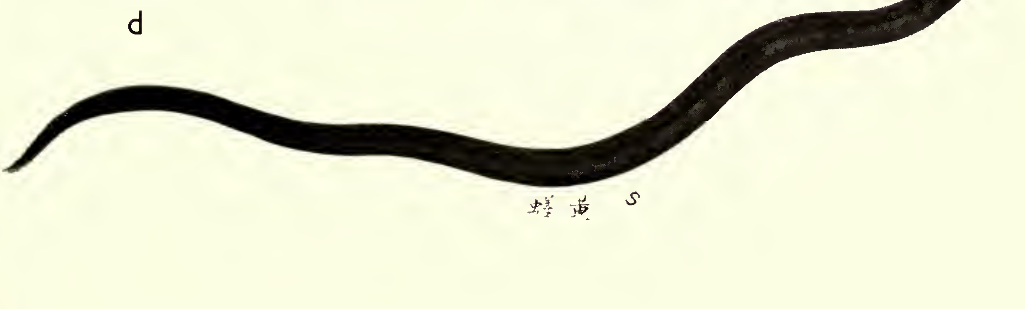


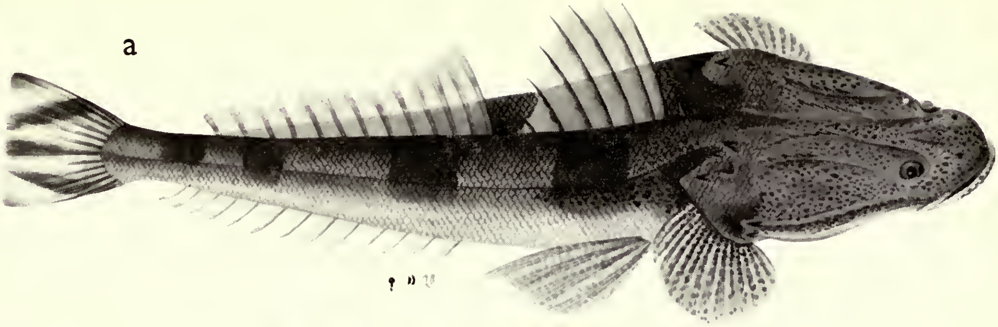
PLATE 21

a. *Platycephalus cultellatus* Rich. (Reeves No. β28), 408 mm. tot. l. (No. 119 in list).

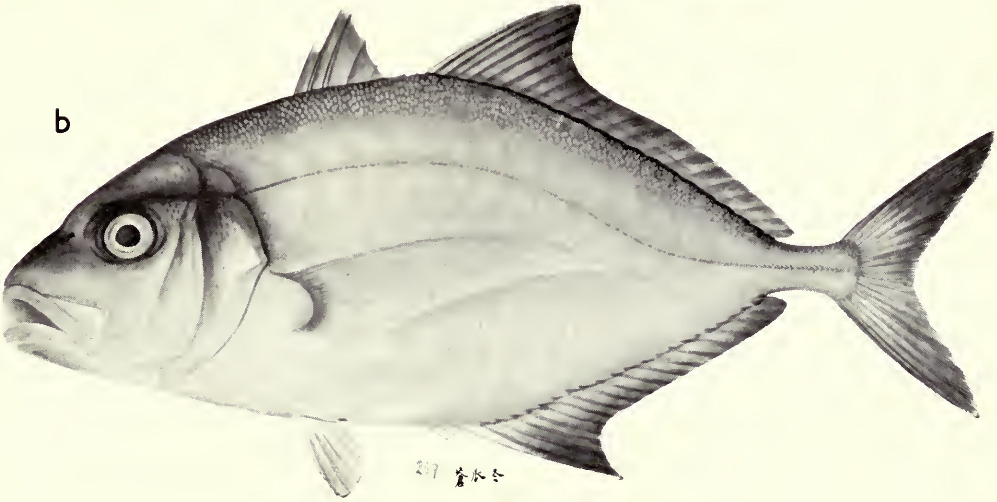
b. *Caranx chrysophrys* var. *hyemalis* Rich. (Reeves No. 239), 365 mm. tot. l. (No. 153 in list).

c. *Caranx margarita* Rich. (Reeves, no number; Hardwicke No. 205), 112 mm. tot. l. (No. 157 in list).

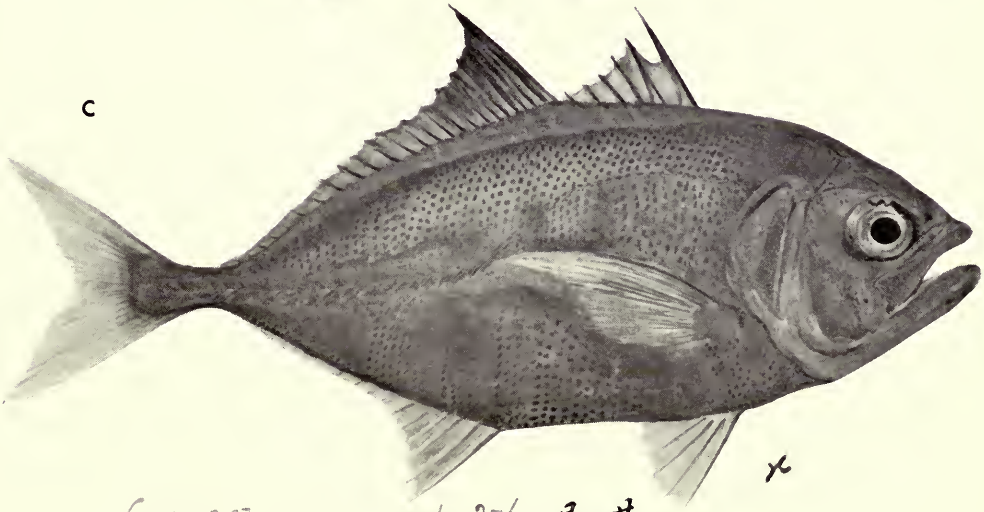
a



b



c



Caranx margeritae 276 腸黃

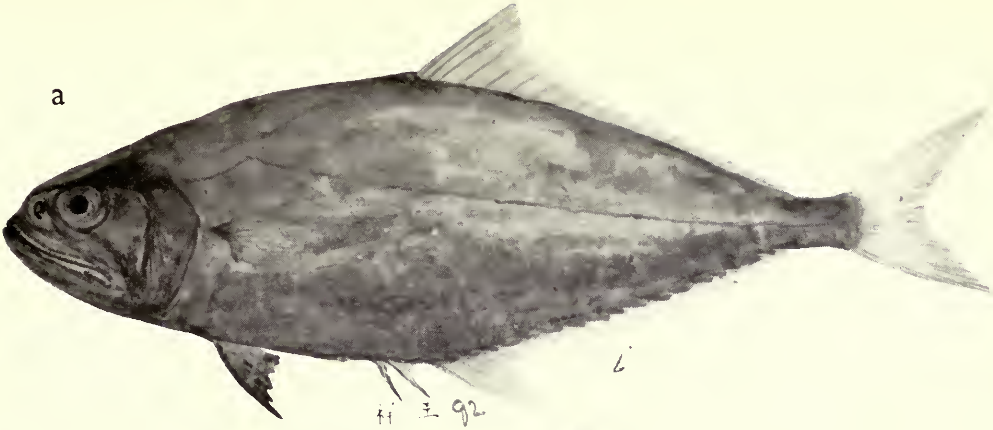
PLATE 22

a. *Chorinemus delicatulus* Rich. (Reeves No. i 92), 156 mm. tot. l. (No. 161 in list).

b. *Chorinemus leucophthalmus* Rich. (Reeves No. 219), 410 mm. tot. l. (No. 162 in list).

c. *Corvina albiflora* Rich. (Reeves No. β48), 302 mm. tot. l. (No. 179 in list).

a



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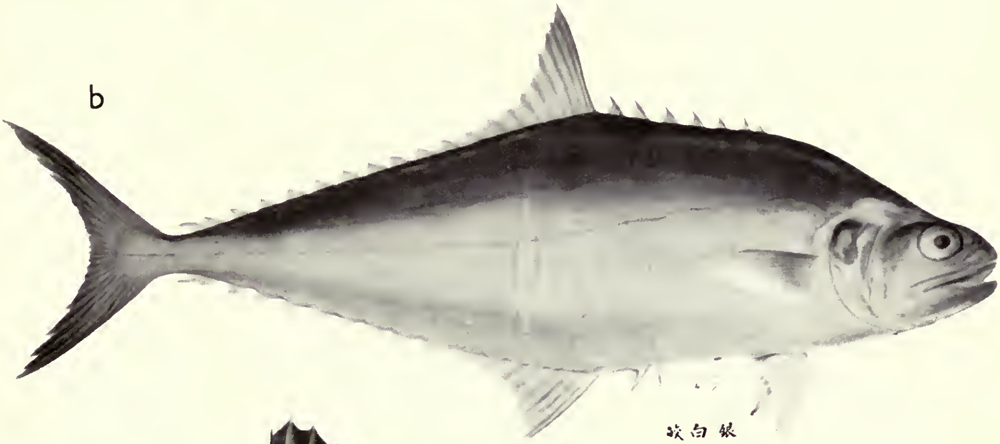

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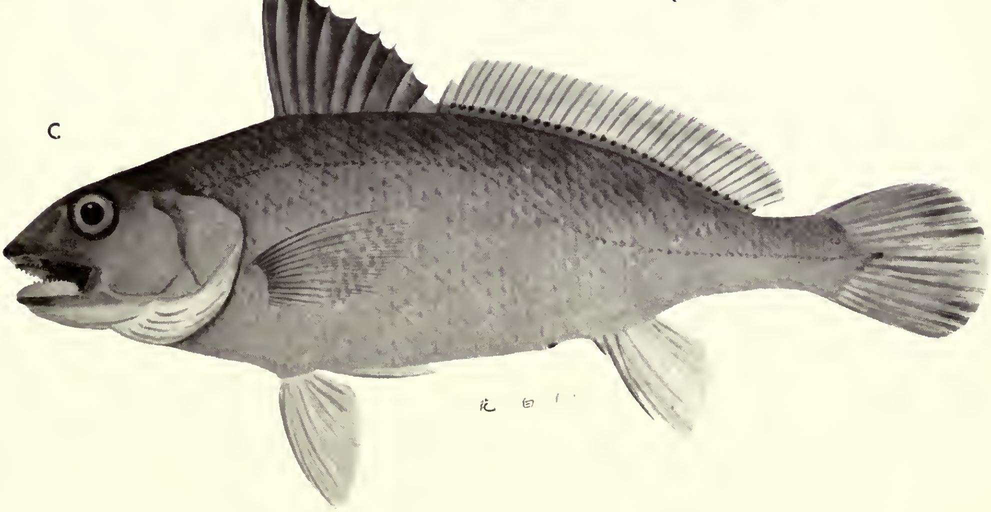
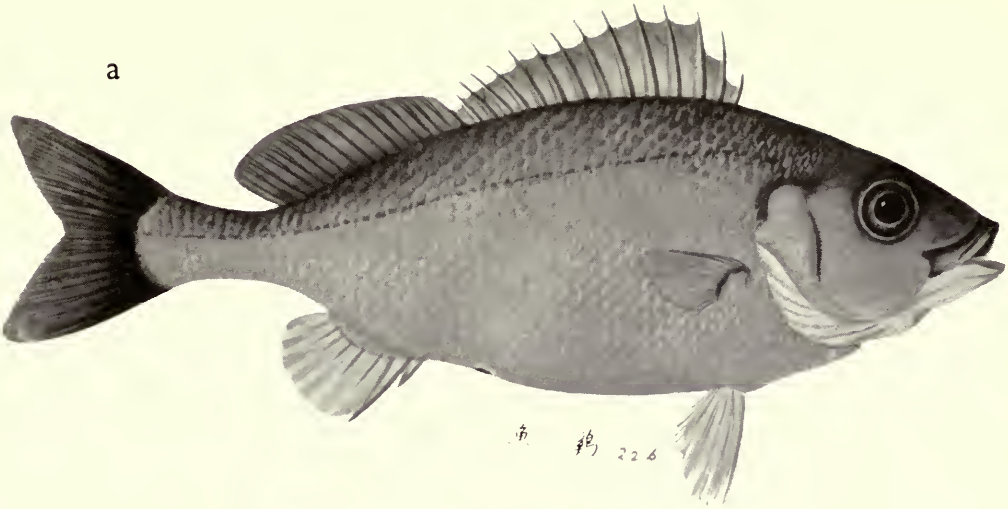


PLATE 23

a. *Pristipoma gallinaceum* Rich. (Reeves No. β22), 224 mm. tot. l. (No. 221 in list).

b. *Hoplegnathus maculosus* Rich. (Reeves No. 270), 293 mm. tot. l. (No. 237 in list).

a



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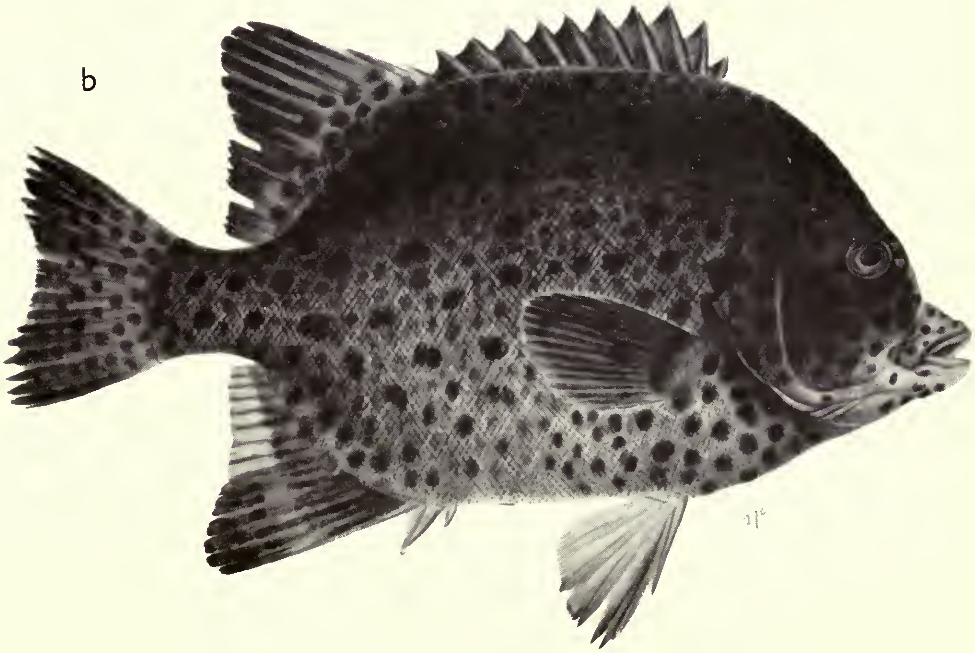


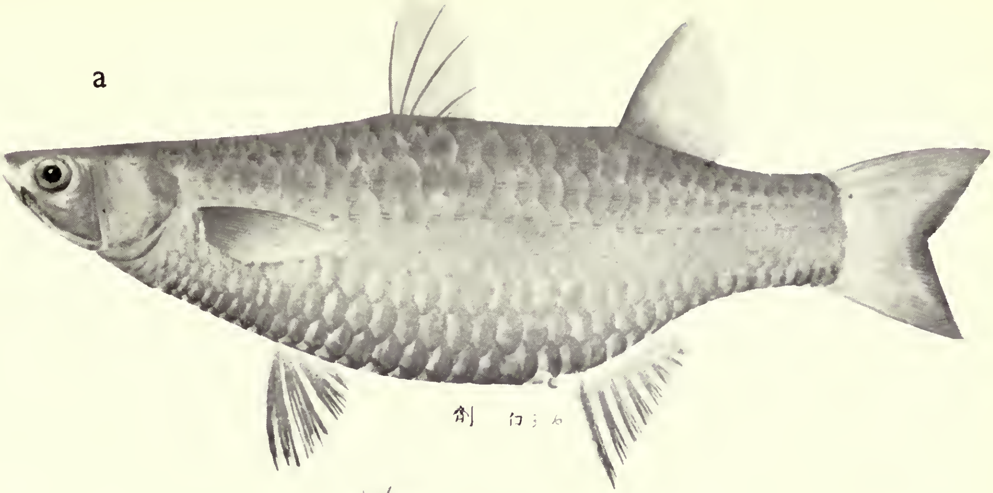
PLATE 24

a. *Mugil ventricosus* Rich. (Reeves No. β31), 267 mm. tot. l. (No. 250 in list).

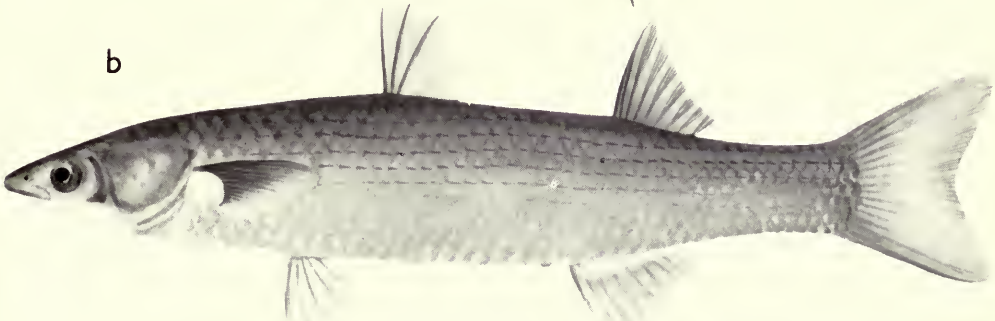
b. *Mugil* (vel *Cestraeus*) *xanthurus* Rich. (Reeves No. 127), 286 mm. tot. l. (No. 251 in list).

c. *Julis exornatus* var. α Rich. (Reeves No. 258), 169 mm. tot. l. (No. 262 in list).

a



b



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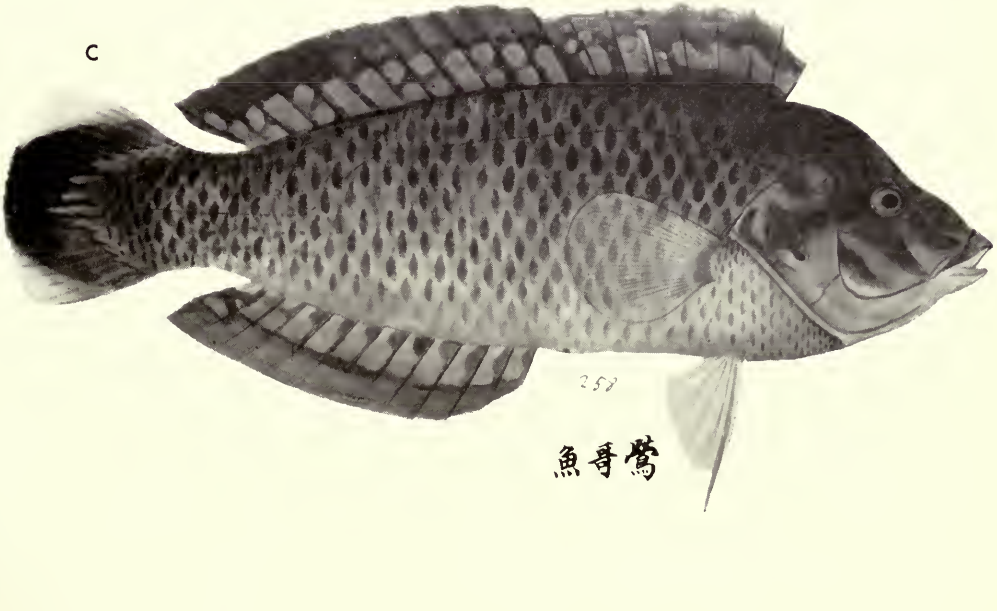


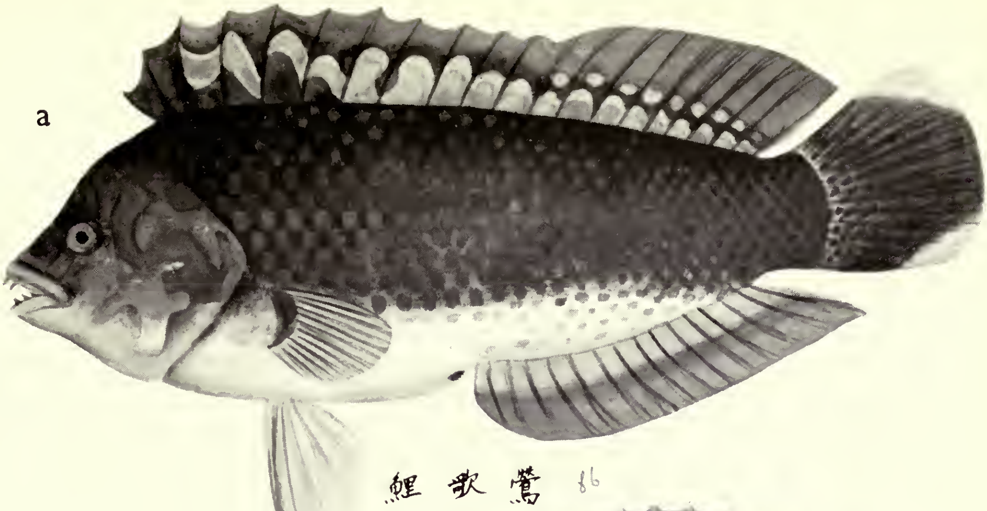
PLATE 25

a. *Julis exornatus* var. *β* Rich. (Reeves No. 86), 157 mm. tot. l. (No. 263 in list).

b. *Julis thyrsites* Rich. (Reeves No. 208), 169 mm. tot. l. (No. 266 in list).

c. *Blennius fasciolaticeps* Rich. (Reeves, no number, p. 124q), 72 mm. tot. l. (No. 275 in list).

a



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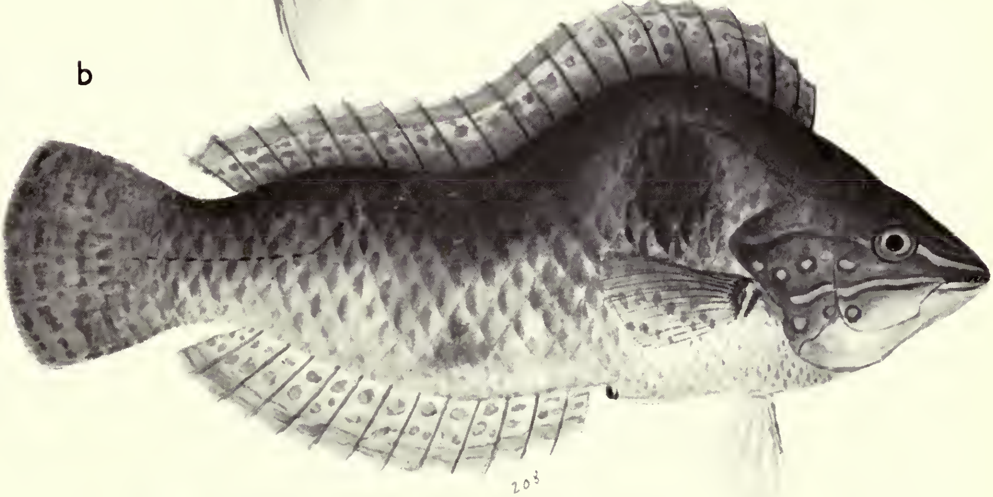

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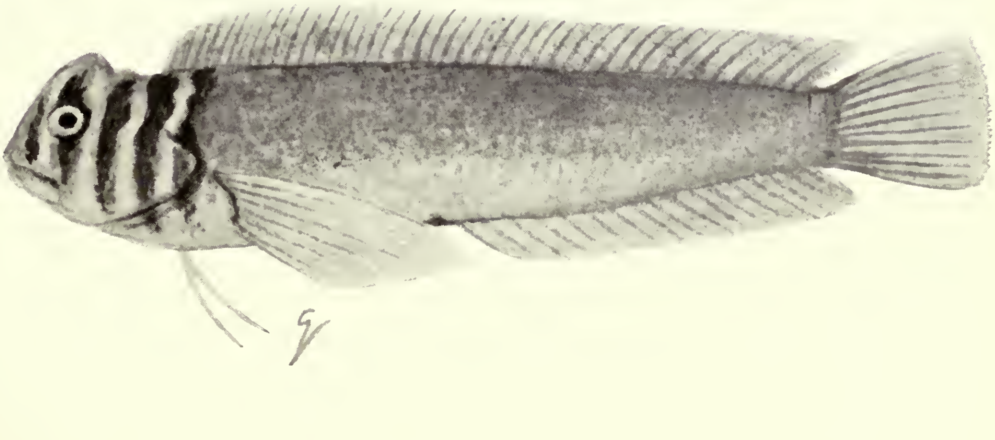


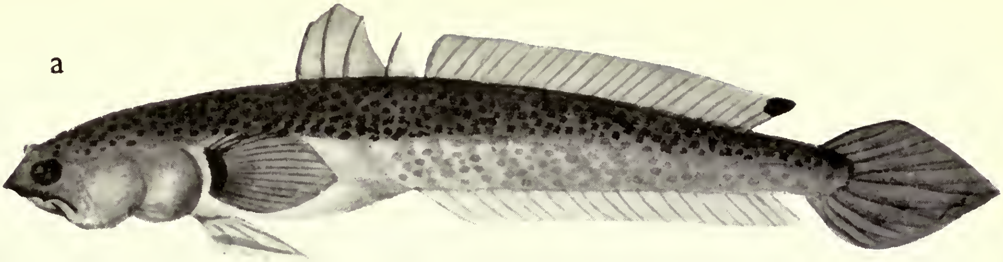
PLATE 26

a. *Boleophthalmus campylostomus* Rich. (Reeves No. β52), 95 mm. tot. l. (No. 280 in list).

b. *Eleotris cantherius* Rich. (Reeves No. 114), 221 mm. tot. l. (No. 281 in list).

c. *Hippoglossus goniographicus* Rich. (Reeves No. 254), 216 mm. tot. l. (No. 303 in list).

a

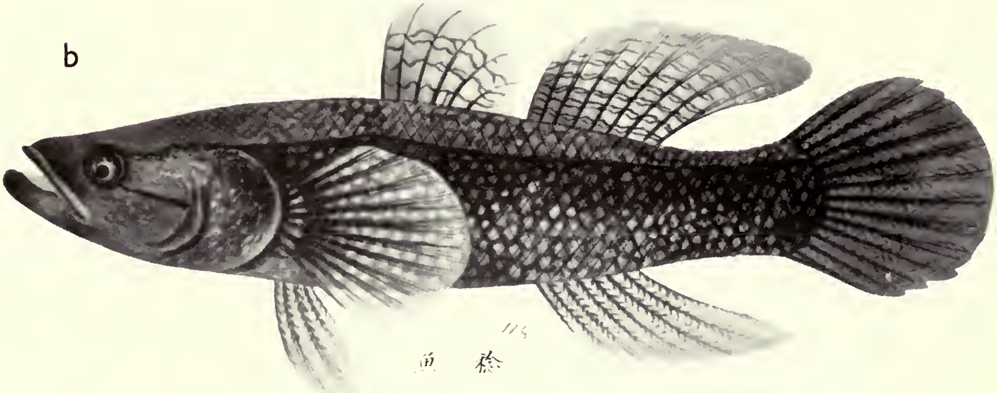


狗 口 擘

52

方

b



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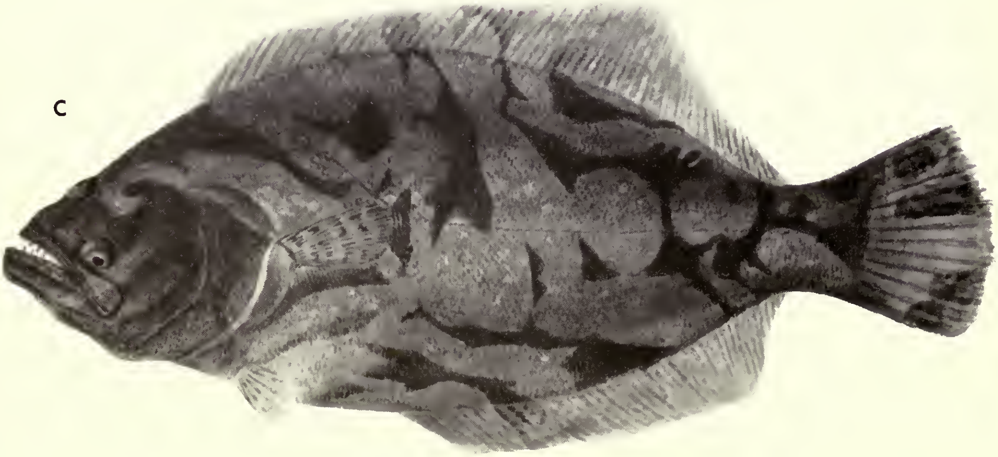
魚 稔

c



254

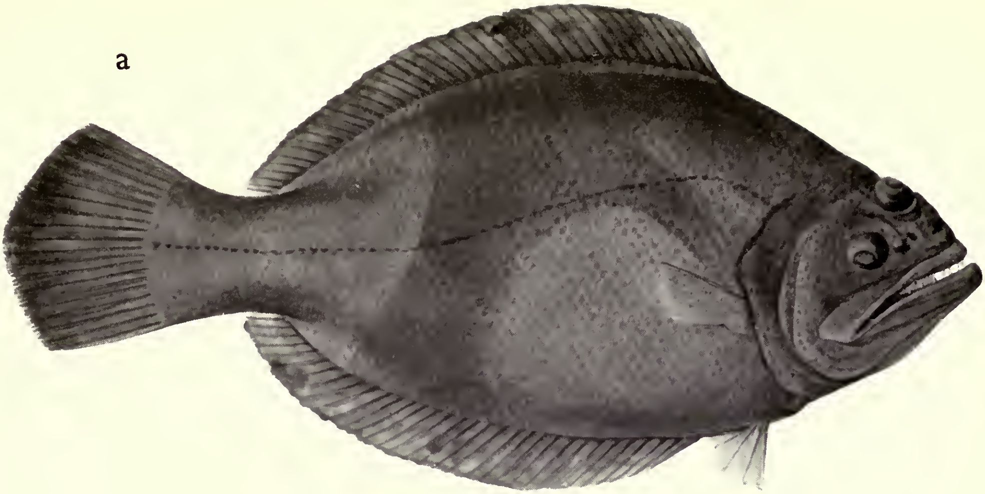
葉 枯 花

PLATE 27

a. *Hippoglossus orthorhynchus* Rich. (Reeves No. 106), 172 mm. tot. l. (No. 304 in list).

b. *Platessa velafracta* Rich. (Reeves No. 105), 191 mm. tot. l. (No. 309 in list).

a



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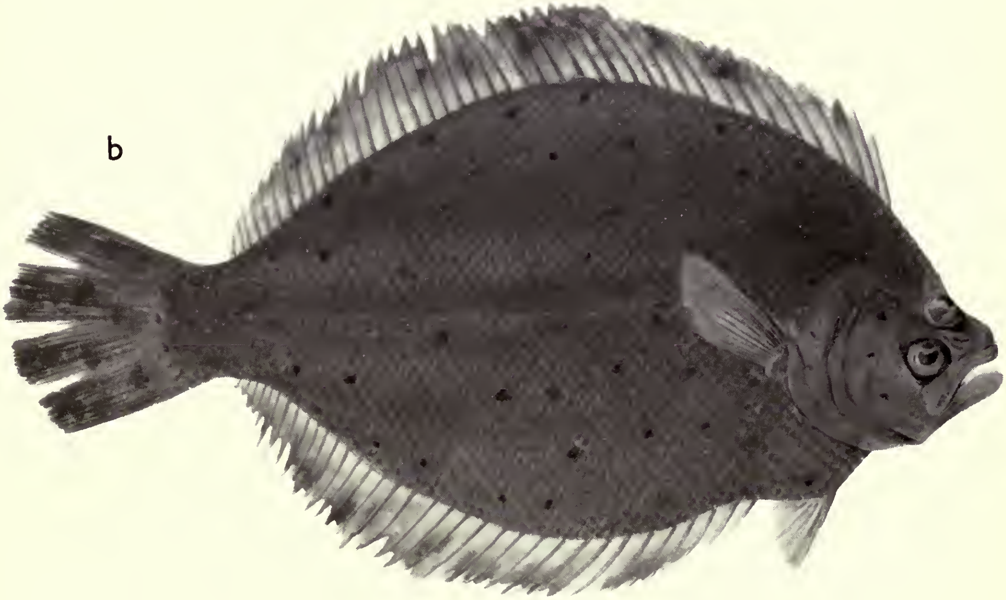


蓮破花 105

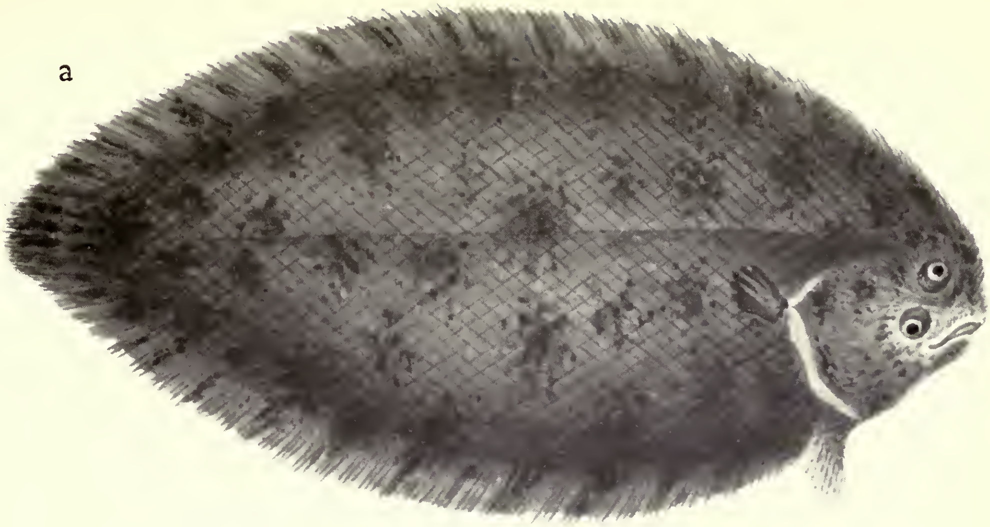
PLATE 28

a. *Solea foliacea* Rich. (Reeves No. β5), 122 mm. tot. l. (No. 311 in list).

b. *Plagiusa auro-limbata* Rich. (Reeves No. 151), 266 mm. tot. l. (No. 315 in list).

c. *Plagiusa favosquamis* Rich. (Reeves No. β50), 235 mm. tot. l. (No. 316 in list).

a



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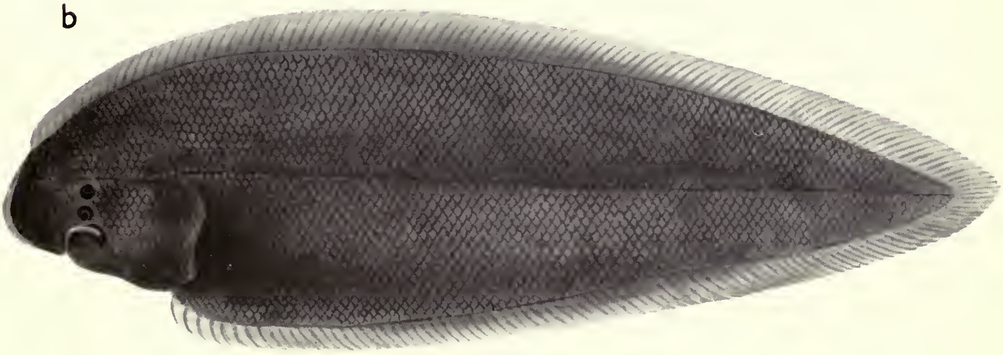

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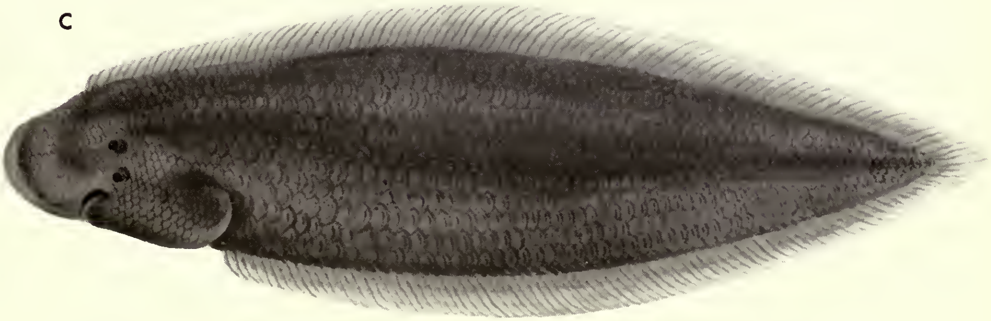

PLATE 29

a. *Plagiusa melampetala* Rich. (Reeves No. 150), 345 mm. tot. l. (No. 317 in list).

b. *Plagiusa nigro-labeculata* Rich. (Reeves No. 152), 268 mm. tot. l. (No. 318 in list).

c. *Plagiusa puncticeps* Rich. (Reeves No. 95 m), 108 mm. tot. l. (No. 319 in list).

BRITISH MUSEUM
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NATURAL HISTORY

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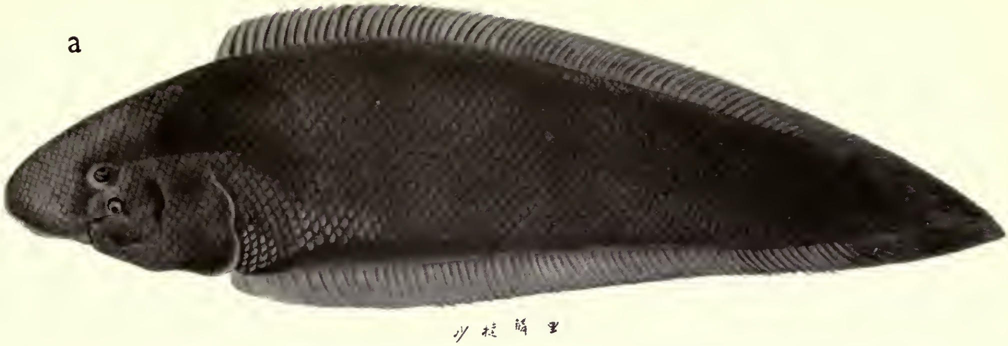

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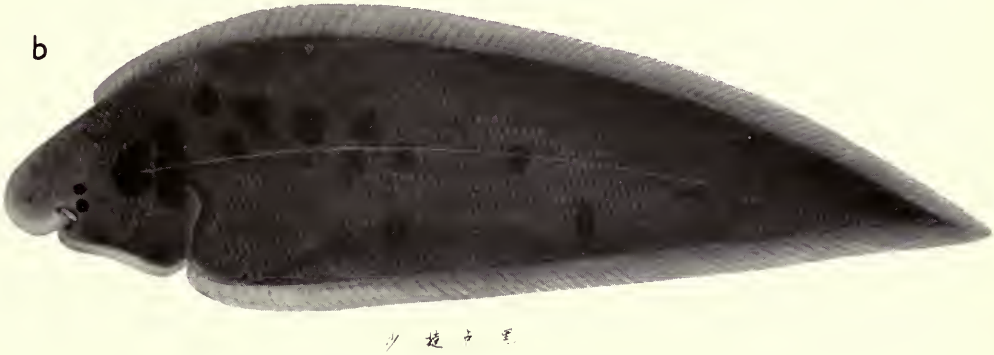

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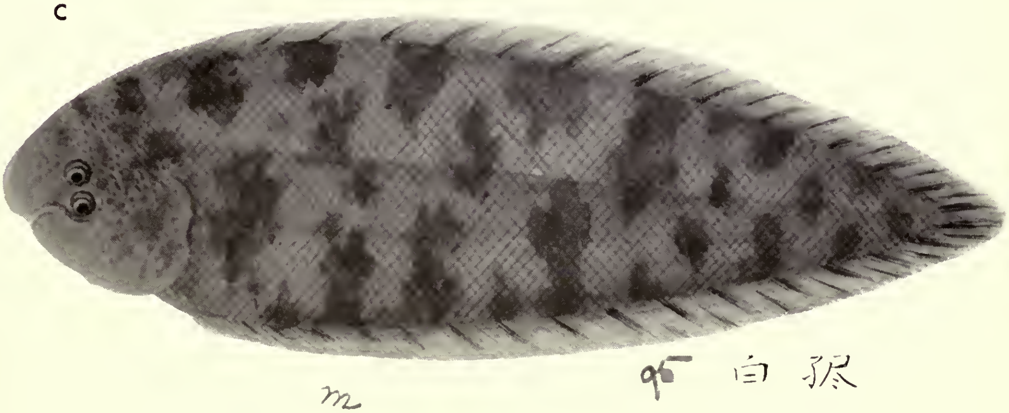

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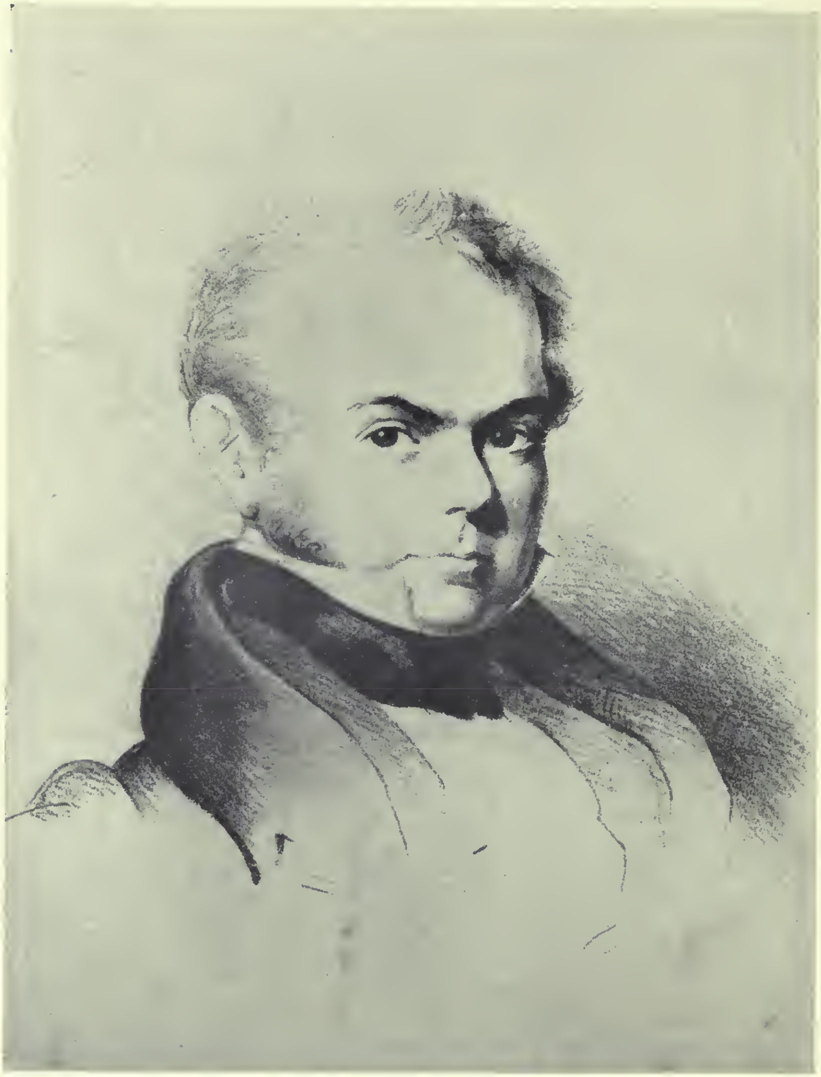
A HISTORY OF THE FIRST HUNDRED YEARS OF THE MINERAL COLLECTION IN THE BRITISH MUSEUM

with particular reference to the work of Charles Konig

BRITISH MUSEUM
29 JUL 1969
NATURAL HISTORY

W. CAMPBELL SMITH

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
HISTORICAL SERIES Vol. 3 No. 8
LONDON: 1969



CHARLES KONIG

1774–1851

From a drawing by E. U. EDDIS, 1831

A HISTORY OF THE FIRST HUNDRED YEARS OF THE MINERAL COLLECTION IN THE BRITISH MUSEUM

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BRITISH MUSEUM
29 JUL 1969
NATURAL HISTORY

BY

W. CAMPBELL SMITH

Formerly Keeper of Minerals, British Museum (Natural History)

Pp. 235-259; *Frontispiece*

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

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This paper is Vol. 3, *No. 8 of the Historical series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

World List abbreviation
Bull. Br. Mus. nat. Hist. (Hist. ser.).

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 29 *July*, 1969 *Price Thirteen Shillings.*

A HISTORY OF THE FIRST HUNDRED YEARS OF THE MINERAL COLLECTION IN THE BRITISH MUSEUM

with particular reference to the work of Charles Konig

By W. CAMPBELL SMITH

THE great collections of " Books and Curiosities " brought together during the many years of his long life by Sir Hans Sloane were acquired by the Nation in 1753 under the terms of his will. Montagu House in Bloomsbury, which with its gardens, stood on the site now occupied by the buildings of the British Museum, was purchased to provide, as the Act read, " one general repository for the better Reception and more convenient Use of the said Collections, and of the Cottonian Library, and of the Additions thereto ". The Collections referred to were " the Museum or Collection " of Sir Hans Sloane and the Harleian Collection of Manuscripts.[1]

The Sloane Collection contained some 10,000 specimens of minerals and fossils listed in Sloane's manuscript catalogues. Relatively few of these are identifiable today but it is clear that at the time of Sloane's death no comparable collection was known in Britain. The mineral collection has been well described by Miss J. M. Sweet, M.B.E., B.Sc., for 34 years a member of the staff of the Department of Mineralogy of the British Museum (Natural History).[2]

Sloane himself laid no claim to being especially a mineralogist or " fossilist " and his description of the " stones, earths, sands, etc. " he brought back from Jamaica in 1689 was his only mineralogical publication. He may have been familiar, of course, with ancient " lapidaries " and their folk-lore of charms and remedies, and perhaps with the far more sensible writings of Agricola (Georg Bauer) of which the best known, " De re metallica " was published in Basle in 1556. In Sloane's own day Bromell[3] and Linnaeus had proposed classification systems of Minerals. In England John Woodward, M.D., F.R.S., founder of the Woodwardian Chair of Geology at Cambridge, had written his " Naturalis Historia Telluris " with several papers referring particularly to minerals and ores of metals (1726), but it is likely that Sloane paid little attention to it for he had had a violent quarrel with Woodward at a Council meeting of the Royal Society in 1710 and Woodward had left the Society because of it.

The collections were moved from Sir Hans Sloane's House in Chelsea to Montagu House and the Museum was opened to the public, to a limited extent, in 1759. James Empson was appointed under-librarian in charge of the Natural History Department. He had been assisting Sloane with his collections for some years before Sloane's death and he was an enthusiastic admirer of the collection of " Fossils and Minerals "[1] but he could spare only a small part of his time to arrange them in the room allotted. He reported in 1756, before the Museum was opened, that he found himself already short of space for the Minerals and was " reluctantly considering placing duplicates in the base story ".

---

[1] Sweet (Jessie M.). Sir Hans Sloane: Life and Mineral Collection. Part I: Life. *Nat. Hist. Mag.*, **5**, 1935, p. 63, and de Beer (G. R.). *Sir Hans Sloane and the British Museum.* London, 1953: p. 152.

[2] Sweet (Jessie M.). op cit., Part II: Mineral Collection. *Nat. Hist. Mag.*, **5** : 1935, pp. 97–116.

[3] Bromell (Magnus von). *Lithographiae svecana* . . . . 2 pt. Upsala, 1726, and *Mineralogie et Lithographica Svecana* . . . . Translated into German. 148 pp. Stockholm & Leipzig, 1740. [1st ed. 1730].

The published description of the arrangement of the Mineral Room in " The general contents of the British Museum . . . " (1761) shows that the " minerals " were chiefly in closed cabinets but two tables (i.e. table-cases) displayed the more attractive mineral specimens.[2]

Empson died in 1765 and after his death no one at the British Museum took much interest in the minerals or in the " figured fossils " until after the appointment in 1787 of Dr. E. W. Gray[3] as Keeper of the Department of Natural History and Modern Curiosities.

In the meantime in Western Europe rapid progress was being made in the study of minerals. Systems of Mineralogy based on the then known chemical characters of minerals had been published by Wallerius (1747) and by Cronstedt (1758). Cronstedt had introduced the use of the blowpipe for the chemical identification of minerals and Torbern Bergmann had initiated the methods of chemical analysis leading to the fundamental discoveries of " multiple proportions " by J. J. Berzelius (1814). In the same period Romé de l'Isle (1772) and René-Just Haüy (1781) had laid the scientific foundations of Crystallography.[4]

The famous mining academy at Freiberg in Saxony was founded in 1765 and Abraham Gottlob Werner[5] was appointed Instructor in Mineralogy and Inspector of Mining there in 1775. His teaching was spread throughout the world by his pupils, and his classifications of minerals and rocks were widely adopted. Robert Jameson, Professor of Natural History in Edinburgh, was one of his most devoted followers and " was mainly instrumental in introducing the Wernerian doctrines into Britain ".[6, 7] Other powerful advocates in the British Isles of the teachings of Werner were Richard Kirwan and George Mitchell in Dublin.[5, 8]

On the continent of Europe the printing of catalogues of the great mineral collections was quite fashionable at the end of the eighteenth century. Three such catalogues were the earliest works of Romé de l'Isle (1767–73). Werner catalogued the mineral cabinet of Pabst von Ohain in Leipzig (1791–93),[1] and Mohs did the same for the Viennese banker von der Null,[2] while Baron Ignaz von Born had published in 1790 a two-volume catalogue of the collection of Mlle. E. de Raab.[3]

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[1] At this period rocks, earths, etc., were all placed under the heading of " minerals " as well as true minerals as now defined.

[2] British Museum. *The General Contents of the British Museum; with remarks. Serving as a directory in viewing that noble cabinet.* Pp. xii, 103. 8°. London, 1761.

—— op cit. *Second edition.* xxiii, 210 + [30]. 12°. London, 1762.

Anon. *Brittisches Museum nebst der Beschreibung des berühmten Naturalien u. Antiquitaeten-Kabinets des Hrn. Ritters Hans Sloane. . . . Aus dem Englischen nach der neuesten Ausgabe.* Berlin, 1764.

[3] Gray, Edward Whitaker (1748–1806). He was one of the Secretaries of the Royal Society (1797–1804). Previous to 1773 he was librarian to the Royal College of Physicians. He graduated M.D., was elected a fellow of the Royal Society in 1779, and he was one of the first associates of the Linnean Society. *Dictionary of National Biography*, **23** : 1890, p. 7.

[4] First introduced as a name for descriptions and classification of crystals by Moritz Anton Cappeller in his *Prodromus Crystallographiae*, published in Lucerne in 1723.

[5] Eyles (V. A.). Abraham Gottlob Werner (1749–1817) and his position in the history of the mineralogical and geological sciences. *Hist. Sci.*, **3** : 1964, pp. 102–115.

[6] Geikie (Sir A.). *The Founders of Geology*, 1897, p. 123.

[7] Sweet (Jessie M.). Robert Jameson in London, 1793. *Ann. Sci.*, **19** : 1965, pp. 81–116.

—— Robert Jameson's approach to the Wernerian theory of the Earth, 1796. *Ann. Sci.*, **23** : 1967, pp. 81–95.

[8] —— Robert Jameson's Irish Journal, 1797. *Ann. Sci.*, **23** : 1967, pp. 97–126.

It was unfortunate that publishing catalogues was not fashionable also in Britain. It is known that in 1794 there were half a dozen fine collections of minerals in England, but of printed catalogues all we have is one of the collection of Philip Rashleigh of Menabilly by himself, and a catalogue of the diamonds in the collection of Sir Abraham Hume by Count Bournon (see below p. 240).[4]

The birth and growth of chemical mineralogy in Sweden and of crystallography in France seems to have attracted little attention in England until near the turn of the century. Then, in 1799, two important collections of minerals were acquired by the British Museum; the first important additions to the Collection since the foundation of the Museum.

One of these collections was a small one of 868 specimens but it consisted of choice specimens. It was bequeathed to the Museum by the Rev. Clayton Mordaunt Cracherode, one of the Trustees, and it was accompanied by a catalogue following the System of Linnaeus. The other collection was that of Charles Hatchett, F.R.S.[5] Its purchase for £700 followed a recommendation made by a committee of which the members were Sir Joseph Banks, Mr. Charles Greville and Mr. Philip Rashleigh. The committee remarked on the lack in the Museum of good British minerals and gave it as their opinion that " a systematic collection of minerals is much wanted in the British Museum ". The committee stated that the collection of about 7,000 specimens consisted of crystallized minerals classified under nine headings: " bituminous, ores, volcanic products, systematic strata of rocks, strata of rocks of the Hartz arranged by Lasius,[6] strata of rocks, arranged by Voight (*sic*),[7] and strata of rocks of Transylvania collected by Fichtel ".[8] It also included a fine set of Russian minerals from Count Apollos de Moussin Poushkin.[9]

Lastly the Committee reported that " Mr. Hatchett is willing to undertake with assistance . . . to arrange the collection systematically and wishes to retain permission to take for analysis small portions from specimens not yet analysed; a copy (of such analysis) to be sent to the officer in charge . . . ; and to assist in correcting errors [in classification] he may thus disclose ".

---

[1] Werner (A. G.). *Ausfürliches und systematisches Verzeichnis des Mineralien-Kabinets des . . . Herrn K. E. Pabst von Ohain.* 2 vols., Freiberg & Annaberg, 1791–93.

[2] Mohs (Friedrich). *Des Herrn J. F. von der Null Mineralien-Kabinet . . . als Handbuch der Oryctognosie . . . gemacht von F. Mohs.* 3 Abth. Vienna, 1805.

[3] Born (Ignaz von). *Catalogue méthodique et raisonné de la collection des Fossiles de Mlle. Eléonore de Raab.* Par Mr. de Born. 2 vols., Vienna, 1790.

[4] Bournon (Jacques Louis de). *Catalogue raisonné des diamants dans le cabinet de Sir Abraham Hume, Bart., . . .* 4to, London, 1815.

[5] Hatchett (Charles) (1765–1847). An eminent chemist. He was elected F.R.S. in 1797, was a member of the short-lived British Mineralogical Society (1799–1806) and of the Linnean Society. He resided at Belle Vue House in Chelsea, a mansion built by his father in 1771. It stood at the west corner of Beaufort Place, now Beaufort Street, and in 1829, commanded " beautiful views of the Thames and the distant Surrey hills ". See Thomas Faulkner's *History of Chelsea*, 1829, in which is a portrait of Hatchett facing p. 89, vol. 1. The Linnean Society has a marble bust of him in its Apartments.

[6] Lasius (Georg Siegmund Otto) (1752–1833). Published *Beobachtungen über d. Harzgebirge . . .*, 2 vols., Hannover, 1789–90.

[7] Voigt (Johann Karl Wilhelm) (1752–1821). Born at Allstadt in Weimar, 20th February, 1752. Published various works on the minerals of Weimar, Thuringer Wald, Ilmenau Bergbau, etc. Died 1st January, 1821, at Ilmenau.

[8] Fichtel (Johann Ehrehreich von) (1732–95). Published *Beytrag zur Mineralgeschichte von Siebenbürgen*, 2 vols., Nuremberg, 1780; also *Mineralogische Bemerkungen von den Karpathen*, Vienna, 1791; and *Mineralogische Aufsätze*, 1 vol., 1794.

[9] A manuscript list of this collection is preserved in the Department of Mineralogy.

It seems that all these recommendations were agreed to by the Trustees. The collection was purchased[1] and Hatchett assisted in arranging it. It was in the course of this work that Hatchett, in the summer of 1801, noticed and borrowed for analysis a specimen from Connecticut sent by John Winthrop to the Royal Society in 1734. It proved to contain a new element which Hatchett named Columbium, after Christopher Columbus, and the mineral containing it is now named Columbite.[2]

All three mineral collections, Sloane's, Cracherode's, and Hatchett's were now united in the Mineral Room, Gray selecting from the Sloane Collection suitable specimens. In this he was assisted no doubt by Hatchett, and, in 1803, he was authorized by the Trustees to engage Count Bournon[3] to give further help and to work on the catalogue.

Bournon helped Gray to examine the mineral collections including the specimens " scattered and lost in the dust of the basement " (see above p. 238). Gray[4] reported " that he added to the catalogue, preserved useful specimens, lotted and made a catalogue of the duplicates, and consigned the rejected specimens to burial in the garden ".

On 27th December, 1806, E. W. Gray died. He was succeeded by Dr. George Shaw[5] and on 19th February, 1807, an assistant was appointed. This was Charles Konig who took charge of the collection of minerals and " figured fossils ". His full name was Karl Dietrich Eberhardt Konig.[6] Born in Brunswick in 1774, he had been a student at the University of Göttingen, and had come to England at the end of 1800, already a botanist of some experience, to arrange the collections of Queen Charlotte at Kew Palace. Later he became assistant to Jonas Dryander, librarian to Sir Joseph Banks. In 1805 he became co-editor with Dr. John Sims[7] of the Annals of Botany to which he contributed seven papers in 1806 and 1807. He had also translated from several European languages botanical papers, and in 1807 a translation by him of C. P. J. Sprengel's " Introduction to the study of Cryptogamous Plants . . . " was published.

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[1] With funds provided by the Major Arthur Edwards bequest. See Edwards (Edward), *Lives of the Founders of the British Museum*, London, 1870, p. 443.

[2] See Sweet (J. M.), op. cit., 1935, pp. 115–116.

[3] Jacques, Louis, Comte de Bournon, was a French Royalist refugee, a pupil of Romé de l'Isle, and an enthusiastic mineralogist. He had been in England since 1794 and he had worked on three well-known English collections of minerals, namely those of Sir John St. Aubyn, Sir Abraham Hume, as mentioned above, and the Right Honourable Charles Greville. He was the first Foreign Secretary of the Geological Society of London, 1810–13.

See Lacroix (A.). *Figures des Savants*, Paris, 1932, vol. 1, pp. 169–176; also in *Mém. Acad. Sci. Inst. Fr.*, **60** : 1931, pp. vii–xiii and lxxxiii–lxxxvi.

[4] The Trustees authorized an auction of 2,000 specimens in 1803. The sale realized £258 13*s.* 8*d.* Gray reported that Bournon had been very helpful. He was paid £50. (Report of 5th August, 1803.)

[5] Shaw (George) (1751–1813), had entered Magdalen College, Oxford, at 14 and graduated in 1769. He studied medicine in Edinburgh for three years, returned to Oxford and was appointed deputy lecturer in botany. He took his doctorate in medicine in 1787. He was elected F.R.S. in 1789 and in 1791 was appointed under-librarian under E. W. Gray in the Department of Natural History. Like Gray he took part in the founding of the Linnean Society and he became one of the Vice-Presidents. *Dictionary of National Biography*, **51** : 1897, p. 436.

[6] König or Konig. The British Museum Catalogue of Printed Books indexes him as Koenig. In the Dictionary of National Biography his name appears as " Konig or König ". He always signed his museum correspondence as " Charles Konig " without the umlaut and this is the spelling followed here.

[7] Sims (John), 1748–1831. F.R.S. One of the original members of the Linnean Society.

Thus up to the time of his appointment to the Museum his work and interests had been mainly botanical but it was now to mineralogy, and later to palaeontology, that he turned his attention. On his appointment Konig was at first instructed to spend two days a week on preparing a " hand catalogue " of the minerals and, later (May), to spend " the whole of his time, on preparing a descriptive catalogue of the consolidated collections of Sloane and Hatchett . . . following the new emendated system of Werner ". He received a further instruction (10th February, 1809) " to make distinct catalogues of all the different collections as presented by any individuals (such as the Rt. Hon. Lord Grenville has recently presented (from Peru)) and to incorporate them also in the general catalogue ".[1]

By the end of the first year, 1807, he had catalogued the contents of 55 drawers, about one quarter of the collection, and in the summer of 1808 we read of him " selecting from the minerals deposited in the basement story such specimens as he thought proper to be preserved in the General Collection ".

In spite of an interruption in this work, referred to below, he reported in December, 1809, that " he has nearly finished his catalogue and commenced a revision of the same . . . ".

This catalogue is not very informative, and Konig cannot have had time to give the specimens more than a cursory examination. It was written on loose sheets which Sir Lazarus Fletcher, Keeper of Minerals, had bound up in two volumes in 1903.

The exhibited parts of the Collection, in Room VIII on the first floor of the House, as it was in 1808 is briefly described in the first edition of the " Synopsis ".[2] Miscellaneous minerals and rocks, the " local " collection, were exhibited on shelves in cases round the room. Case I contained " a collection of Derbyshire minerals, formed by Mr. White Watson,[3] partly arranged according to the succession of strata in which they are found ". Case 5 contained " Siberian minerals " [probably from the Moussin Poushkin collection]; cases 8 and 9, " Volcanic Productions from Mounts Vesuvius, Somma, and Aetna " [probably Hamilton collection]; and case 10, " Rock Stones from Germany, shelf 1–4 from the Hartz, 6 and 7 from Saxony " [Hatchett Collection]. Two tables (cases) displayed " the valuable donation of Mr. Cracherode ", and on part of table 2 " Various articles chiefly selected out of the Sloanean Collection "; and in Division 8 Meteoric Stones. Another meteorite, the Pallas iron, Krasnojarsk, presented by the Academy of Sciences of St. Petersburg in 1776, was exhibited in case 13 as " a large cellular mass of native iron, with much of the olivine-like substance, from Siberia ". In addition to the exhibited specimens, " a much more extensive series arranged according to Werner's system of mineralogy in 210 drawers is in imposts round the room ".

While this work of cataloguing was going on the chance came in 1809 quite unexpectedly for the Museum to acquire another mineral collection of great repute. The Rt. Hon. Charles Francis Greville (1749–1809), second son of the first Earl of Warwick and a nephew of Sir William Hamilton, died suddenly in April 1809. His mineral collection has been mentioned above in connection with Bournon's work on it. It was in Greville's house in Paddington Green. Bournon had said that it " was far superior [to the Museum collection] and indeed it was reputed as good as any on the continent of Europe ".

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[1] A manuscript catalogue of this collection, 189 specimens chiefly ores, is preserved in the Department of Mineralogy.

[2] *Synopsis of the Contents of the British Museum*, 1808.

[3] Watson (White), Derbyshire geologist, Published in 1811 " A delineation of the strata of Derbyshire . . . . from Bolsover . . . to Buxton ".

Greville left no will nor had he made any provision for the preservation of his collection as a whole. Konig lost no time in recommending the Trustees to acquire it, writing to Sir Joseph Banks about it on 24th April, 1809. On 5th February, 1810, by which time the collection was advertised for public sale, he wrote again proposing through Mr. Planta, the Principal Librarian, a scheme for the arrangement of three separate collections: oryctognostic [i.e. mineralogical]; British minerals arranged in cases by counties; and Technical, adding: " should the Trustees think it convenient to purchase the matchless collection of the late Mr. Greville . . . the plan proposed or any modification of the same ought with the assistance of the collections already formed easily be executed ". The Trustees acted promptly and on their petition to Parliament, a committee was appointed " to examine the collection and to put a value on it ".[1] The committee reported that the collection was " equal in most, and in many parts superior, to any similar collection which any of us have had an opportunity of viewing in this or other countries ". On the report Parliament voted a special grant and the collection was bought for £13,727 (22nd May, 1810).

The collection contained about 20,000 specimens and included a collection formed by Baron Ignaz von Born (1742–91) of Prague, which Greville had purchased for £1,000.[2] The cut stones in the collection had been sold separately. On the other hand the collection contained fragments of seven meteorites, one, Tabor, acquired with the von Born collection.[3]

Count Bournon who had worked on the Collection for some 12 years (see above, p. 240) now made great efforts to persuade the Trustees to put him in charge of the Greville collection, and its removal from Paddington Green to the Museum but it appears that Konig was opposed to this and he undertook the removal of the specimens himself.

In a minute of the Trustees of 26th June, 1810 they gave instructions: " that the gentlemen who are entrusted with the making of an inventory of the minerals purchased from the late Mr. Greville be directed not to make any alteration in the arrangement of the classes without a special report to a meeting of the Trustees and receiving the sanction of the meeting on such report".

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[1] Extracts from the Journals of the House of Commons. 26th March, 1810, *in Acts and Votes of Parliament relating to the British Museum . . . .* London, 1814, pp. 97–100.

[2] This collection was accompanied by a manuscript catalogue which is still preserved in the Department of Mineralogy. No catalogue of the Greville Collection as a whole has survived. *History of the Collections contained in the Natural History Departments of the British Museum*, 1904 : **1**, pp. 359, 416 and 424.

[3] This meteorite and others in the Greville collection were those on which Edward Howard (and Count Bournon) made their " Experiments and Observations on certain stony and metallic substances which at different times are said to have fallen on the Earth, . . . ". *Phil. Trans. R. Soc.*, 1802, pp. 168–212. A few further notes on meteorites added to the collection in Konig's time are given in Appendix II (p. 259).

Konig made a list of the contents of each drawer and laid it before the Trustees on 13th July, 1810. Unfortunately these lists have not been preserved.

He reported that over and above the 14,800 specimens counted " a number of specimens, on account of their [large] size, were not added to the collection, as also a quantity of rubbish which Mr. Konig has not yet found time to examine ". He records that he has discussed with Sir Joseph Banks the arrangement of the collection of minerals just acquired by the Museum and has devised a satisfactory plan. He added that this "may be deemed preferable to the scheme lately proposed by M. de Bournon, of forming two collections of the same kind, the one for the man of science and the other for the stupid gaze of the visiting vulgar ".[1]

Count Bournon, who one must remember was very put out at not having been appointed to take charge of the Greville Collection, seems to have taken a poor view of the way the collection was handled. He is reported to have said that the tickets placed in the trays [by himself] were displaced even during the valuation. He also remarked that Greville, in the last four years of his life (i.e. after Bournon had ceased to work for him) had turned out a great number of scientifically interesting specimens to make room for others he had recently bought from Mr. Heuland.[2] The specimens removed were, according to Bournon, consigned to a garret or outhouse and probably were never replaced.

To return now to the rest of the mineral collections.

While still awaiting any move to acquire the Greville Collection Konig reported (December, 1809) that he had commenced an arrangement of a geological collection " in the second table of the mineral room which at present contains agate vessles, cups, etc. . . . and that he had retrieved from different parts of the House (Montagu House) several well preserved specimens of volcanic products from Mount Vesuvius ". Earlier he had reported retrieving a chest containing similar products from Mount Etna.[3]

Early in 1810 Konig had asked for the Saloon[4] to be allotted to the Mineral Collections and now, when the Greville collection was acquired, he proposed to " add to it such specimens from the old collections as are wanting in that lately purchased by the Trustees . . . " The species were to be arranged according to a " natural order founded on external characters; not, however, without consulting the chemical composition of the substances as far as convenience would admit ". This was a modification of Werner's System. He set about a new catalogue on these lines and submitted to the Trustees sheets of the catalogue for Platina and Gold (7th December, 1810). These have not been preserved.

The Trustees seem to have been a little anxious about the proposed incorporation in the Greville collection of specimens from the earlier collections of Sloane, Cracherode, and Hatchett and Mr. Konig is enjoined to take " especial care before they are mixed to distinguish by marks affixed to each specimen the particular collection to which each belongs ". (9th March, 1811).

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[1] Quoted from an appendix to papers read (at the Linnean Society) at the Banks Celebration on Thursday, 17th June, 1920. *Proc. Linn. Soc.*, **1919–20**, 132nd Session, supp., pp. 20–21.

[2] Heuland (John Henry), (1778–1856), the fashionable mineral dealer, who about this time had established his business in London.

Russell (Sir Arthur), *Mineralog. Mag.*, **29** : 1952, pp. 395–405.

[3] Probably from Sir William Hamilton's collections presented between 1767 and 1779.

[4] The Saloon was a large room facing north approached through the Vestibule at the head of the main staircase on the first floor of Montagu House. The Mineral Room originally allotted was a smaller room approached through the Saloon on its west side. A plan of the rooms on the first floor is shown in " Lives of the Founders . . .", op cit., p. 325.

Konig got the Saloon for his minerals and began moving them in during 1812 but in the following year, after the death of Dr. Shaw, he was given charge of the whole of the Natural History Department with the rank of under-librarian (19th August, 1813). He had only one assistant, Dr. W. E. Leach,[1] to help him with all the zoological collections. Nevertheless the minerals seem to have remained his chief interest and he missed few opportunities of bringing to the notice of the Trustees any important collections that came on the market. In 1814 (19th September) he submitted the catalogue of the collection of the Marquis de Drée[2] to the Trustees and recommended its purchase later that year (11th November). It was declined, probably because the Trustees had in mind the purchase of the library and collections of Baron von Moll of Munich. Sir Joseph Banks, writing to Sir Charles Blagden,[3] 20th February, 1815, tells him " Baber and Konig are treating for the purchase of Baron Moll's library and, if they are successful, there will be no funds available for Drée's collection at the British Museum ".[4]

Konig went with H. H. Baber, Keeper of Printed Books, to arrange for the transport of the books, herbarium, and minerals of the von Moll Collection[5] from Munich. On his return (8th May, 1815) Konig reported that the collection contained many minerals of great scarcity especially from Salzburg and the Tyrol. Konig had also been authorized to spend up to £100 on the purchase of specimens and he reported having expended about half this amount with Frischholz of Munich.

In 1816 (8th March) Konig reported on two other collections; those of M. Rempasse and of the late Baron Franz Cölestin von Beroldingen of Hanover and the Palatinate.

Of the Rempasse Collection he reported that it contained " nothing new or otherwise worthy the acceptance of the Trustees with the exception of the suite of Orbicular Granite and the Porphyry both of which are remarkable ". On the other hand he made a very favourable report on the Beroldingen collection which had passed to the late Baron's nephew, Count Joseph Iglase von Beroldingen, the Würtemburg Minister in London. " Mr. Konig remarked particularly on the specimens of quicksilver ores which bore numbers referring to F. C. Beroldingen's ' Bermerkungen auf einer Reise durch die Pfalzischen und Zweybruckschen Quecksilber-Bergwerke ' (1778)." Heuland, who was asked by Konig to examine the collection, valued it at

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[1] Leach (William Elford) (1780–1836), F.R.S., 1816. See *Dictionary of National Biography*, **32** : 1892, pp. 311–312; also below p. 250.

[2] Drée (Etienne Gilbert) Marquess. *Catalogue des objets rares et précieux formant les huits collections . . . qui composent le Musée minéralogique de M. le Marquis de Drée.* Paris, 1814.

The collection was purchased later by Henry Heuland and incorporated in his own collection. See Russell (Sir Arthur), op cit. *supra.*, p. 396.

[3] Blagden (Sir Charles) (1748–1820), F.R.S. Physician. Secretary of the Royal Society, 1784.

[4] Dawson (Warren R.). *The Banks Letters.* London, 1958. Nos. 320, 321, 324 and 325 (1815), p. 98. Also in earlier letter from Banks to Konig, 9th October, 1814, ibid. p. 509.

[5] The von Moll Collection was purchased for £4,768 including contingent expenses out of funds bequeathed by Major Arthur Edwards originally intended to provide a building for the Cottonian Library. The bequest was for £7,000. *Lives of the Founders*, op. cit., 1870, p. 11. The Edwards bequest also met the cost of the Hatchett mineral Collection. *Lives of the Founders* . . ., op. cit., pp. 26, 305 and 443. For another reference to this bequest, see *Acts and Votes of Parliament Relating to the British Museum*, ... London, 1814, p. 101.

£800 at least. The collection was accompanied by a two-volume catalogue in manuscript. This Mr. Konig " placed on the table for the inspection of the Trustees ". The collection was purchased in November, 1816. It contained between 12,000 and 14,000 specimens.[1]

The next notable acquisition was the collection of Vesuvian and other minerals and rocks made by Teodoro Monticelli, Professor of Chemistry at Naples. The first boxes arrived in May, 1823, and Konig does not seem to have been over enthusiastic. " Duplicates over and over again " he comments in his private diary.[2] Fletcher, however, writing in 1904 says: " Many of the best specimens of crystallized Vesuvian minerals now in the Museum came as part of the Monticelli collection ".[3] The collection was accompanied by a manuscript list in the handwriting of Professor N. Covelli.

News of another important addition to the collection was received in 1823 but the specimens were not actually moved to the Museum for six years owing to shortage of suitable space. Mr. Konig noted in his diary on 27th May, 1823, " Mr. Planta has received a note from Sir Everard Home in which he informs him the King has presented the Hartz Minerals to the Museum ". This was the collection of Hartz Mountains minerals which had been presented to the King, and which was housed at Kew Palace. Kew Palace was shut up in 1818, and there is a note in Konig's diary on 9th August, 1820, that he " wrote to the Duke of Cambridge[4] about the Hartz collection of minerals at Kew ".

Fletcher in the " History of the Collections " has described this collection as consisting of " choice specimens . . . the large groups of calcite and of pyrargyrite being especially fine ".[5] The collection was not reported as an acquisition until 1828 and the Trustees gave instructions that the specimens should be moved as soon as the new building is ready (see below, p. 249). The move from Kew was made in 1829.[6] They were placed in upright glass cases on the eastern wall of the Long Gallery.[7]

This was the last important collection of minerals to be presented or purchased for the Mineral collections during Konig's lifetime but there was a steady stream of acquisitions of selected specimens year by year and there was a great improvement in the standard of specimens purchased. The most important of these are described in the " History of the Collections " (1904).

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[1] In the *Lives of the Founders* (op. cit., p. 26), the collection is listed under notable acquisitions as: " The Beroldingen Fossils " and, taking this to mean " Figured Fossils " the Author quite wrongly describes it as " the only considerable acquisition made in this department, between Brander's gift of fossils gathered from the London Clay) in 1766, and the purchase of the Hawkins' Collection in 1835 ".

[2] Part of a private diary of Konig's has been preserved. It covers only the period from 9th July, 1816 to 1st May, 1825 with a gap from 16th December, 1817 to 28th June, 1819. The entries are very brief. A manuscript copy was made in 1942 by Dr. Herbert Smith and it is from this copy that the occasional extracts from the diary have been taken. The notes are in English but the more private entries are in German script and are sometimes almost undecipherable. (G.F.H.S., 1942).

[3] *History of the Collections* . . ., **1** : 1904, p. 362.

[4] Adolphus Frederick, 7th son of George III, 1774–1850. He, like his brother the Duke of Sussex, had studied at Göttingen.

[5] *History of the Collections* . . . **1** : 1904, p. 363.

[6] A note in *Lives of the Founders* (op. cit., p. 29) records the presentation in 1829 of the " Hartz Mountains Minerals. Collected at various periods and by several mineralogists. This fine cabinet of minerals was for a considerable period preserved at Richmond ". Here " Richmond " is an error for " Kew ".

[7] *Synopsis of the Contents of the British Museum*, Edit. 26, 1832, p. 157.

There was a very considerable acquisition of cut and polished stones in 1825 and 1826 when a collection of about 300 stones was purchased from Mr. H. C. G. Struve, Russian Minister-Resident at Hamburg.

Up to this time faceted gemstones were very poorly represented in the Collection of Minerals. Among the specimens recognized as belonging to the Sloane Collection one gem of outstanding interest is a large sapphire " set with (small) rubies, emeralds and gold in a hemisphere of rock-crystal and mounted in silver ".[1] Most of the other precious stones in the collection in the early days were probably uncut natural crystals. Konig reported in 1811 that he was working on a catalogue of these but the only part of the catalogue preserved refers to " Diamonds ". It is written on alternate pages of a large 4to book. Ninety-seven diamonds are listed and the entries end at page 61. The water-mark on the paper used is 1816.

In January, 1825, in recommending the purchase of six diamonds (two crystals and four coloured stones, three of them cut brilliants) Konig " begs to state to the Trustees that the coloured precious stones that formed a fine suite in the Coll. of the late Mr. Greville were disposed of by the executors previous to its being purchased by Parliament so that scarcely any specimens illustrative of colour are to be seen in the otherwise very instructive and valuable assemblage of crystallized diamonds that constitute a part of the great collection of minerals in the museum ".

In May, 1825, Konig was in correspondence with Mr. Struve about the sale of his collection and on 9th December he lays before the Trustees a prospectus and drawings of some of the minerals and " begs to recommend to the Trustees to supply a deficiency in their own collection by purchasing . . . the cut and polished precious stones the price of which is 1,400 dollars or about £238. It consists of about 300 articles among which are two beautiful star stones or asteria sapphires, one of 88, the other of 30½ carats . . . ". The collection also included " a series of models of the various crystal forms of precious stones cut in glass imitating their respective colours, and a suite of pieces of amber enclosing various objects ". The collection was purchased for £245 and Konig notes in his diary that the cut stones from Mr. Struve arrived, 15th February, 1826.[2]

The only other considerable purchase of gemstones in Konig's time was in December, 1849, when 62 diamonds were purchased through Professor James Tennant from the Collection of Henry Philip Hope, once the owner of the " Hope Blue ".[3]

A very fine collection of minerals belonging to the Dowager Countess of Aylesford was purchased after her death in 1832 by Mr. Heuland and many fine specimens from this Collection were purchased by the Trustees in 1834. The sum expended amounted to £379 3*s.* 0*d.* Konig had expected to spend a much larger sum.[1]

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[1] Konig reporting to the Trustees in February, 1823, " begs permission to cause Sir Hans Sloane's sapphire which has become detached from its socket to be reset " and presumably this was done. There was nothing to indicate to later generations that this beautiful jewel had belonged to the Sloane collection and it was Miss J. M. Sweet who re-identified it in 1935 from the entry in Sloane's catalogue.

Sweet (J. M.) op. cit., *Nat. Hist. Mag.*, **5** : 1936, p. 113 and fig. 14.

[2] The collection (but not the gemstones) is described in: Marx (Carl Michael), " Ueber die Struvesche Mineralien-Sammlung ", Kastner, Archiv. für die gesammte Naturlehre, 1827, vol. 12, pp. 220–226; and ibid., 1830, vol. 19, i.e. Kastner, Archiv. für Chemie und Meteorologie, 1830, vol. 1, pp. 370–379. Abstract in *Jb. Miner. Geogn. Geol. Petrefakt.*, **1832**, p. 426. See also a list of the more important stones in the *History of the Collections* . . ., 1904, p. 362.

[3] Hertz (B.). *A Catalogue of the Collection of Pearls and Precious Stones formed by Henry Philip Hope Esq., systematically arranged and described.* London, 1839.

A further selection of very fine specimens from this collection, bought from Mr. Heuland, was presented to the Museum in 1836 by Mr. R. Simmons, F.R.S. Though there were only 12 specimens they were valued at £300. They included native gold from Mexico, priced at £150, and two beryl crystals from Nerchinsk, Transbaikalia, of which one purchased for only £45 was thought to be worth £100.

It is surprising that there is no mention in Konig's diary of the collection of the Abbé Haüy who died in 1822. This collection was bought by the Duke of Buckingham. When the collection came up for sale again in 1848 after the Duke's death it was purchased by a Frenchman and it returned to the Natural History Museum in Paris where Haüy was for so long Professor.

Some collections of rock-specimens made by explorers in what were then remote and unknown parts of the world began to reach the Museum soon after Konig's appointment, but most collections of this kind were presented to the Geological Society of London which had been founded in the same year, and which was already forming a considerable collection.

The earliest of such collections to reach the British Museum was one made by Robert Brown, naturalist on H.M.S. *Investigator* during Captain Matthew Flinder's Expedition to " Terra Australis " in 1801–03. It was presented in 1811 by the Admiralty.

In the same year Sir Joseph Banks presented specimens collected in Venezuela by Baron F. H. A. von Humboldt in 1799 and 1800; in 1817 the Admiralty presented through Sir Joseph Banks a small collection of gneisses, schists, etc. made by Prof. Christen Smith and Mr. Tudor at the mouth of the Congo River in 1816. A narrative of this expedition was published in 1818 to which Konig contributed a brief account of the rocks. This was Konig's first geological publication.[2]

From time to time the Admiralty presented specimens collected on the early Arctic expeditions and many others including the voyages of James Clark Ross to the Antarctic Regions between 1839 and 1843. Some notes on these and on other collections of rocks presented in the early years of the Department will be found in Appendix I (p. 257).

The work of arranging the minerals in the Saloon went steadily on and the arrangement " except Native Salts " was finished early in 1815. Konig proposed using the old Mineral Room for Geological specimens and in July of that year, after his return from Munich, he reports that he is arranging a Technical mineralogy collection of mineral substances in a wrought state in one case. In November, 1816, he proposes " to take the weight off the floor of the Saloon by looking out all the British specimens . . . " and he asks for the " first room ", (later referred to as Room X) to be fitted up for the reception of the British minerals. The Trustees agreed and ordered " that in future the British minerals be kept distinct " and Mr. Konig is ordered to give an estimate for the tables for arranging them. A model of the Table (case) was approved at the Trustees' meeting on 14th December. In the following year he reports that the British minerals are temporarily arranged in the basement story and in May, 1818, the British Mineralogy room is to be open " immediately after the holidays ". Konig had at last carried through his plan, first proposed in 1810 and repeated in 1815, of a three-fold arrangement of the mineral collections: " oryctognostic ", British and Technical.

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[1] The amount spent with Mr. Heuland between 1817 and 1835 according to invoices preserved in the Department was £1,682 16*s.* 6*d.*

[2] Also in a German translation:

Konig (C.). " Uber die Mineralien welche auf Tuckey's unglücklichen Ausrüstung am Congo gesammelt wurden ". *Isis*, Jena, **1819**, col. 234–236.

James Kingston Tuckey, commander, R.N. died after completing a land journey to find out what lay beyond the cataracts.

The " Synopsis " for 1818[1] has a plan of the cases in the Saloon, and an alphabetical list of the minerals with references to the cases in the plan. Room X contains the " British Oryctognostic Collection ". This contains " the rudiments of a collection of British simple mineral substances " in which a series of table-cases show the minerals of the first seven counties of England in alphabetical order from Bedfordshire to Devonshire.

Konig at this period was giving some attention to the " Secondary Fossils ", which were exhibited in Room IX, adjoining the Mineral Room. It was also about this time that the Trustees had arranged to purchase the geological collection of William Smith, later to be known as the " Father of English Geology ", and Smith began delivering his collection to the Museum in June, 1816.[2, 3]. Entries in Konig's diary referring to this collection continue to the end of 1817 and it does not appear from these that he did much to facilitate the exhibition of the collection. In later years he seems to have come to appreciate William Smith's work rather better, when he was turning his attention still more to the fossils.[4] In December, 1819, he reports, perhaps in answer to an enquiry from the Trustees, that " the collection of Minerals and Fossils is the only part of the collection (of Natural History) susceptible of being completed and rendered perfectly useful to the public ".

In the following year, 1820, on the 19th June, Sir Joseph Banks died. He had exercised great influence as a Trustee and had taken great interest in the Natural History collections. Konig must have sadly missed his advice. One of the last references to Sir Joseph in his diary is for 13th December, 1817, when Konig notes that he made " Long report on Smith's Collections (Sir Joseph's as he drafted it) ".

There were further changes impending. Montagu House was rapidly becoming too small to house the growing library and other collections. As early as 1815 the Trustees had appointed Robert Smirke as architect to draw up plans for a new wing to the old house. Konig has a note in his diary that the Trustees had received a report from Mr. Smirke in April, 1820, on the state of the Museum and on the Elgin Gallery. He notes, " This is probably the first step of a general change ", and so indeed it proved to be. Discussions on proposals for the new buildings began in 1821 and money for the purpose was voted by Parliament and work started in 1823.[5]

The rooms for the King's Library were the first to be built, the new wing running out northwards into the gardens from the N.E. corner of the old house. The galleries above the King's Library were intended for pictures but they were allotted temporarily to the Natural History Departments. This part of the new building was nearly finished in October, 1826 and on 11th May, 1827 Konig submitted plans for the use of the space allotted to him and proposed that work on the " distribution of the objects of the three great branches of Natural History might be commenced before the new building was quite completed in the summer vacation when the Museum will be closed during the months of August and September and about which time the whole of the present edition of the Synopsis will be exhausted ".[1] The minerals were to be arranged in the Long Gallery. Plans for their arrangement were presented on 7th March, 1828, in a report of which the draft occupied six pages of Konig's note-book. The " System adopted, with occasional slight deviation, is that of Professor Berzelius, founded upon the electro-chemical theory and the doctrine of definite proportions ".[2]

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[1] *Synopsis of the Contents of the British Museum*, 14th edition, 1818, p. 62.

[2] Cox (L. R.). New light on William Smith and his Work. *Proc. Yorks. Geol. Soc.*, **25** : 1942, pp. 1–99.

[3] Eyles (Joan M.). William Smith: the sale of his geological collection to the British Museum. *Ann. Sci.*, **23** : 1967, pp. 177–212.

[4] *Report from the Select Committee on the . . . British Museum*, 1835, p. 205. Questions No. 2886, 2887. See footnote p. 249.

[5] British Museum. *The Buildings of the British Museum*, London, 1914, pp. 3–4.

Instructions for transferring the collections to the new building were issued in April, 1829, and it was proposed to open the new gallery to the public after the Easter recess in 1831.

Konig worked on the rearrangement steadily in 1830 and by November he was able to report that only nine out of the 59 cases in the Long Gallery remained to be arranged.[3] In the course of this work he had redistributed in the general collection the British minerals which had been set apart in 1818 (see above, p. 247–8). Labelling the minerals went on during 1833 and 1834, Konig writing all the " tickets " himself.

During his evidence before the Select Committee on the British Museum in 1835 Konig was questioned about this and was asked if he thought it right that he should do such menial work. To this he replied: " I do not consider writing as menial work, and I do it with great pleasure; I have no more objection to write the tickets than I would if the collection were my own ". He had no assistance in arranging the minerals and " he did the whole himself ". There were two men who filled the trays with cotton [wool]; they filled upwards of 12,000 trays.[4]

The minerals did not remain many years in the Long Room of the new building. In 1833 the north side of Smirke's quadrangle was taken in hand and in 1838 the move of the Mineral Collection to this northern wing began.

Just before the move to the northern wing was made another very important change took place. The Natural History departments, hitherto all under Konig's care, were divided in 1837 and the Departments of Mineralogy, Botany and Zoology were set up with a " Keeper " in charge of each. Charles Konig became the first Keeper of Minerals (including Fossils).

The rooms " appropriated to the collections of Mineralogy and Secondary Fossils " were above the library on the north side of the North wing. There were six rooms and there were two small studies at the west end of which probably one was assigned to the Department of Minerals.[1], [2]

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[1] The books of the King's Library were transferred from Kensington Palace in July, 1828.

[2] A report on the Department of Natural History made to the Trustees by Sir Henry Ellis, Mr. Konig and Mr. Children was published as Appendix No. 27 to the *Report from the Select Committee on the Condition, Management, and Affairs of the British Museum*, 1835, pp. 436–437.

[3] *Synopsis of the Contents of the British Museum*, 1832, 26th ed., p. 124; op. cit., pp. 124–160. This contained an alphabetical list of the minerals exhibited in the Long Gallery as far as they were then arranged with references to the table-cases (pp. 158–160). Case 1 contained meteorites, native iron, Cu, Bi, As; Case 2 gold and other native metals; and so on to case 49, manganese carbonates.

[4] *Report from the Select Committee*, op. cit., 1835, p. 189.

In the same year in which the three new Departments were set up the General Register of Acquisitions was started and thereafter every mineral specimen and every collection of rocks or of fossils and every important individual fossil was recorded. This marked a very great advance in the accurate recording of specimens with particulars of the locality for each one and whether presented, purchased or acquired by exchange, and from whom. During the ensuing 100 years or so specimens acquired before 1837 were entered in special volumes of the Register with all such particulars as could be ascertained.

The years after the division of the Departments and the move to the northern wing were somewhat uneventful after the many changes that had taken place in the first 30 years of Konig's service in the Museum. The rearrangement in the new rooms of the minerals and fossils and their labelling occupied ten years. During this time there was a steady stream of new acquisitions including many of the finest specimens in the Collection. The General Register records additions of something over 200 specimens a year. The actual numbers with notes on the more important acquisitions are recorded in the History of the Collections (op. cit. *supra*). Among them it is interesting to note the great group of gypsum crystals from Reinhardsbrunn, Gotha, Germany, presented by the Prince Consort in 1847 and now exhibited outside the entrance to the Mineral Gallery; and the lovely specimens of pale pink fluor—" the Couttet rose-fluors "—presented by John Ruskin in 1850, the year before Konig's death.

In trying to make a fair assessment of Konig's work at the Museum one should bear in mind that from 1813 to 1837 he had charge, not only of the Mineral Collection but also of the whole Natural History Department. He had but one Assistant librarian, Dr. William Elford Leach, who was appointed in 1813. Leach had long periods of leave for collecting and travel in England in 1816 and again in 1819 when he went to the Orkney Islands. He became a very sick man in 1820 and so remained, eventually resigning in 1822. Leach was succeeded by John George Children, who had been appointed an assistant librarian in the Department of Antiquities in 1816. After Leach's retirement became inevitable there was some discussion between Sir Humphry Davy, Konig, and others on Mr. Children's transfer. One gathers from Konig's diary that he was not very enthusiastic about this proposal but Children was transferred in 1823.

Children in his evidence before the Select Committee in 1835 said " the transfer was effected . . . at the suggestion of Sir Humphry Davy and almost without my being consulted on the subject and it has proved very much to my disadvantage. It was not made in consequence of any wish of my own ".[3] However, we have it from Konig's diary notes that Children, very soon after his first appointment, had told

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[1] *Synopsis of the Contents of the British Museum*, 1840, 40th ed., pp. 93–123, index pp. 127–131. Cases are numbered 1 to 62.

[2] Edwards (E.). *Lives of the Founders . . .* , 1870. Plan facing p. 754, attached to a report of the sub-committee of the Trustees respecting the removal of the Natural History Collections.

[3] *Report from the Select Committee*, op. cit., 1835, p. 271.

Mr. Planta that he would rather assist in Mr. Konig's department. Children was very well qualified for a post in the Natural History Department. When quite a young man he had travelled extensively and had studied electricity and mineralogy. He had worked with his father, the Tonbridge banker, George Children, on the construction of large galvanic batteries which they made in a laboratory in the garden of his home, Ferox Hall, Tonbridge, where they were visited on occasions by Sir Humphry Davy. The results of their experiments were published in 1809 and 1815. In 1822 J. G. Children had published " The use of the blowpipe . . . in the examination of Minerals " by J. J. Berzelius (translated from the French of M. Fresnel) with a sketch of Berzelius' System of Mineralogy . . . This was the year previous to his transfer to the Natural History Departments. After his transfer he published in 1824 and 1825 papers on the chemistry of several minerals and " A summary view of the atomic theory according to the hypothesis adopted by Berzelius ".[1] The mineral " childrenite " was named after him by H. J. Brooke in 1823.[2]

Children was elected a Fellow of the Royal Society at the early age of 30, and he was one of the Secretaries from 1826–27 and again from 1830–37. On the division of the Natural History Departments in 1837 he became the first Keeper of Zoology. Since his transfer from Antiquities he had worked hard on the Zoological Collections. Konig had come to think very highly of him and said so in evidence before the Select Committee.[3] He had become joint editor of the newly established Zoological Journal (1825) and he was one of the founders of the Entomological Society, and he was a member of the Geological Society and an early member of its Council. He retired in 1840 at the age of 63, to Halstead Place, Kent, where he occupied his leisure in the study of astronomy. He died 1st January, 1852 aged 75 years.

We cannot claim that Konig was a great mineralogist but undoubtedly he did devote himself wholeheartedly to his Department and in particular to the care and arrangement of the Collection of Minerals. One of his contemporaries writing a short obituary notice of Konig refers to the " magnificent display . . . which now adorns the galleries ".[4] In earlier years H. J. Brooke wrote that he found at the British Museum " the utmost facility afforded for research by the habitual urbanity and friendly attention of Mr. Konig ",[5] and in another place he refers to " that rich collection, upon which his attention is so constantly and so assiduously bestowed ".

It does not seem that Konig saw much of many of the British mineralogists other than Hatchett and Wollaston at the Museum and, on occasional visits, H. J. Brooke. He never joined the Geological Society where he might have met Aikin, Babington, and Richard and William Phillips, all founder members of the Society. Perhaps after his election to the Royal Society, 1st January, 1810, and after he became its

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[1] Thomson, *Ann. Phil.*, **9** : 1825, pp. 185–193, and 336–358.

[2] A specimen of childrenite with others from Children's collection was presented by his daughter, Mrs. Anna Atkins, in 1871.

[3] *Report from the Select Committee*, 1835, op. cit., p. 203.

When asked: " Are any of the more eminent naturalists of the day officially connected with the British Museum in any capacity ", Konig replied: " We have Mr. Brown, who is the greatest botanist in the world ". To the next question: " Is there any other? ", he replied: " Mr. Children's merits are very great. Mr. Children has done much for Science. He is also well versed in several branches of Natural History ", and " I think he is a good zoologist ".

[4] Reeve (Lovell), in *Literary Gazette and Journal of Belles Lettres*, London, 8th September, 1851.

[5] Brooke (H. J.). *A familiar introduction to crystallography*, London, 1823, p. vi.

Foreign Secretary, (1830) he may have seen more of other mineralogists but, certainly in his earlier years he remained very much aloof. We have already seen that he would have little to say to Bournon (see above p. 242).

His apparatus at the Museum was extremely limited. He had a Wollaston " reflective goniometer " in 1810 and he notes that a new vernier was fitted in 1832. Previous to this, in 1809, he asked for authority to purchase, at a total cost of eight guineas, three pieces of apparatus figured and described in Haüy's Traité de Minéralogie,[1] namely: an " areometer ", a kind of hydrometer devised by William Nicholson (1785) for measuring the specific gravity of solid bodies;[2] an electrometer, and a Carangeot contact goniometer. In 1811 he asks for " a good pair of scales with decimal weights " and he requests that his instruments may be kept in the " old medal room " and for a good place for his scales. One gathers that anything he could call a laboratory was non-existent. In fact Konig said as much in his evidence before the Select Committee in 1835. Asked whether he had sufficient accommodation for the efficient discharge of his duties, he replied: " I, individually, at present have. There is one room which is very much deteriorated since a small skylight has been substituted for a window: but still I have a room to work in ". When asked a further question about the light he said: " I cannot (now) measure a crystal with a reflective goniometer, neither can I do so in the gallery ". (On account of the risk of fire no artificial light was allowed). Referring again to the absence of any provision for a laboratory he said: " Some years ago I applied to the Trustees for a collection of tests . . . which I have fitted up in my room ".[3] Certainly he does not seem to have had very efficient equipment.

When Konig began work at the Museum in 1807 the only modern books on mineralogy in English were those by Kirwan and Jameson, both men of the Werner school. For other authorities he would have to turn to the French works of Romé de l'Isle, Haüy, and Brochant de Villiers (another of Werner's pupils), and, in his native tongue, to Werner and the mineralogical part of Gmelin's edition of the Systema Naturae, and some other, rather undistinguished, works.

By 1820, when he was making preparations for a new descriptive catalogue of the collection, he had about a dozen " mineralogies " available including the second edition of William Phillips' " Elementary Introduction to the Knowledge of Mineralogy " (1819) which gave a fair account of crystal form and of Haüy's theory of the structure of crystals. From these " mineralogies " Konig commenced to extract all that was known about each species, but this catalogue was never completed and after the move into the new buildings he added little to it.

Evidence before the Royal Commission in 1849 drew attention to another catalogue, this time of books, which Konig had compiled but which was not published and which seems to have been lost. Sir Roderick Murchison asked him had he not completed a " classed catalogue of the books relating to his Department entitled ' Bibliotheca Mineralogica-Geologica '". To this Konig replied: " I began such a catalogue in about 1820; I occasionally worked on it to 1836 when it was pretty complete; I then offered it to the Trustees inquiring if they had any objection to publish the work, as I could not do it myself ". He had worked on this in his own time. He had written about it to the Archbishop, one of the Principal Trustees, on 5th November, 1836 and estimated that it would form two octavo volumes of moderate size. The Trustees replied 18 months later that " they approved of the plan which they would not lose sight of, but then it was not the time to consider the subject . . . ". Some of the " fasciculi " were exhibited when he gave the above evidence.[1]

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[1] Haüy (R. J.). *Traité de Minéralogie* . . . Paris, 1801, pl. vii, pp. 212, 239 and 248.

[2] Mem. Lit. Phil. Soc., Manchester (ser. 1), **2** : 1789, pp. 386–396.

[3] *Report from the Select Committee* . . ., 1835, p. 201.

Another work started by Konig in quite early days was intended to illustrate fossil organic remains. It was entitled " Icones Fossilium sectiles (with descriptive text by Konig), 4to, London, 1830 ". Only one part appeared. His other palaeontological publication was " On a fossil human skeleton from Gaudeloupe " published in the Philosophical Transactions in 1814.

We do not learn very much about Konig's private life from his diary entries. These are chiefly jottings referring to departmental activities and correspondence. There are, however, frequent references to his unmarried sister in Germany, to his journeys on the continent to see her, and brief mentions of his annual vacations which have some interest.

Konig was a bachelor and for most of his long service at the Museum he resided in one of the official apartments at Montagu House. He had " a large room for a drawing room and a small room adjoining, a dining room under the drawing room, a bedroom, two garrets, and a kitchen ".[2]

His salary at the time of the Select Committee's enquiry in 1835 was: a fixed salary for two days attendance of £200, and £225 for three additional days extra duty making a total of £425. He also received a sum of about £5 under the will of Dr. Birch, and an allowance for stationery of about £5.

His household expenses were probably not excessive. He notes in August, 1819: " paid Church his coal bill, £17 18*s*. 6*d*", and similar amounts are paid to Church in 1820 and 1821. An item referred to as his " house bill " is £11 17*s*. 0*d*.; 26th July, 1822, and £8 10*s*. 6*d*. on 8th May, 1823. Newspapers for six months to end of July, 1823, cost £1 19*s*. 0*d*. The wages of his servant, Ann, in 1822 are " now at the rate of £19 19*s*. 0*d*. p.a.", but he gave her a Christmas box of two guineas on 30th November that year. He seems to have maintained a modest wine cellar and there is a note sometime during each year of wines and spirits received. In 1823 there is a note of the bill: " paid wine bill £24 17*s*. 0*d*." ; and in 1825, 31st March : " Bill of £19 presented late in the evening from Smith, Payne & Smith, Mansion House Place, for which 5/– was charged which I refused to pay, the bill not having been presented before ".

Occasionally he notes when friends dined or breakfasted with him, and there are notes of some of the occasions when he dined out. There are frequent references to dinners at Sir Joseph Banks' at Spring Grove and on one occasion, 13th September, 1816, the names of other guests are mentioned including those of Gay Lussac, Arago and three others. After the death of Sir Joseph, Lady Banks seems to have invited Konig to dinner regularly on New Year's Day, and probably others from the Museum too. Konig dined there in 1822 and 1823 but " was too unwell to accept " in the following year.

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[1] *Report of the Commissioners appointed to inquire into the Constitution and Government of the British Museum* . . . London, 1850. (Konig's second examination, 15th February, 1849), p. 336.

[2] *Report from the Select Committee* . . . , 1835, p. 186.

Konig seems to have kept himself quite well dressed in the fashion of the times. There are brief diary entries about new clothes and of bills paid. Evidently he preferred his coats to be blue, trousers in shades of grey, and waistcoats yellow drab, yellow buff, and yellowish white, but striped for summer wear, and, on one occasion " black stippled zigzag ". Between September, 1822 and June, 1823 he has two blue coats, one pair blackish grey trousers, one pair black breeches, one pair black pantaloons, and two yellow waistcoats. In August that year he pays Sommers (? Summers and Prosser) £40, having paid a similar amount on account at the end of July, 1822, and £33 17*s*. 6*d*. on 7th August, 1821 " for last year's bill ".

On the death of King George III, 29th January, 1820, he notes " black coat sent ". The Under-librarians went at once into mourning. One wonders if the black coat was an issue.

At the coronation of George IV, 19th July, 1821, Konig was on duty as Hanover King at Arms, and he notes in his diary, " a day of great fatigue to me ".[1] Subsequent entries as late as 1825 show that there was some discussion about the payment of Meyer's bill for the coronation dress.[2]

The diaries contain a few entries of subscriptions or donations:

1816, 29th November. " Gave to the Churchwardens of Bloomsbury for the poor, £2 2*s*.
1821, 13th December. " Paid £5 5*s*. to Sabine for Sir J. Banks statue."
1824, 2nd April. " Paid Mr. Green £1 1*s*. for the Society for Foreigners in distress."
1824, 16th June. " Committee for promoting humanity to animals, at Slaughter's Coffee House. Subscribed £1 1*s*."

Konig was a member of the Athenaeum from 1825[3] and of two Literary Clubs and Lovell Reeve tells us (loc. cit., p. 251) that " His extensive acquaintance with the German dialects led to his acquiring a considerable taste for philology, in the cultivation of which much of his leisure time was latterly passed, and in which department of literature he formed a valuable library ".

The diary contains brief notes of summer vacations. In 1816 Konig goes on 20th August to the Isle of Wight with Dr. Sims, the botanist, and Miss Sims. Leaving there he returns to London but sets off again on the following day via Norwich to Yarmouth where he spends another week and returns to town by Bury St. Edmunds and Cambridge. A whole day was spent at Cambridge but there is no mention of any visits paid.

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[1] Joanna Richardson in *George IV: A Portrait*. London, 1966, p. 221, writing of this coronation notes: " Only once again would Blanc Coursier King of Arms bear the Crown of Hanover to Westminster ".

[2] 1824, September. On his return from a visit to his sister in Germany he finds " bill of Meyer's for coronation dress sent to me under the name of Charles King. I shall certainly not pay him as I was expressly told by the Count Munster and Sir G. Nagle that I have nothing to pay for the costume. There is a sword in the bill which I never had. The Kings at Arms wore no swords ".

1825, 18th May. " Another letter from Meyer resp. the coronation dress. Mr. Hodgson advised me not to notice it."

1825, 21st June. " Called on Mr. Egan, the solicitor, resp. Meyer's demand ".

1825, 4th October. " Sent coronation dress to Moller."

As far as the diary entries go that is the end of the matter. Who paid Meyer?

[3] He was invited to become a member without ballot by Mr. Heber, 1st November, 1824, and he notes, " accepted it without knowing that the subscr. begins with New Year ". However, on 10th January, 1825, he " paid £21 to Drummond's for Athenaeum ".

Of more interest is a months vacation in 1819 spent mainly at Matlock and Buxton in Derbyshire. During this tour he visited from Matlock; Mawe's Fluor Cavern, Rutland Cavern, Mawe's Museum, High Tor, Cromford Moor mine, and Brassington. He notes that he " called on Thomas Pearson the guide who got the muriate of lead [?Phosgenite] for Mr. Greville." Also he called on Mr. Arkwright (Willersley Castle) with a letter from Sir Joseph Banks and was shown the grounds by Mr. Arkwright himself.

He " went ' post ' by Bakewell to Buxton and put up at the Gt. Hotel ". While there he rode out to Castleton, saw the Peak Hole, Speedwell Mine and Pool's Hole, and from Elias Hall he ordered two models of the topography of Derbyshire and Cumberland (probably for his planned exhibit of British minerals arranged by counties).

He returned to London by Macclesfield, Stone, and Wolverhampton—where he stayed over the weekend with a friend, Mr. Thursby at Tettenhall—and thence on by coach to Oxford where he stayed a night and finally to London by the afternoon coach. At a rough estimate he had covered about 400 miles mostly by mail coach and post except for the journey from Derby to Matlock which he covered more pleasantly " with Dr. Henderson in his gig ". They visited Kedleston on the way and admired the noble mansion and its beautiful entrance hall but, especially two beautiful Rembrandts; " Joseph explaining the Dream " and the " Portrait of an old man ".

Very frequent in the diary are notes of letters to Konig from his sister and his many letters to her. She was evidently unmarried and rather unsettled, moving at rather frequent intervals, and sometimes complaining of ill health. Konig makes notes of sums of money sent to her about twice a year and varying between £15 and £20 in English money and he goes to considerable trouble to arrange for these payments. Twice he made journeys for the express purpose of visiting his sister. The first time, in 1821, he set out at very short notice and reached Aix-la-Chapelle where he had asked for a letter to be sent to him (presumably to tell him her present address) but finding none he returns, receives her letter at Calais, but continues his homeward journey. This seems a little odd.

On the second attempt, in 1824, he is quite successful and stays several days at the end of his long journey at Hemsbach-bei-Weinheim where his sister then lived. On his return journey he stayed in Heidelberg, called on Professor Gmelin, who had visited him at the Museum in 1816, and had supper at Professor Leonhard's. He returned by Rastadt, Achern, and Kehl, to Strasbourg where he visited the museum and bought some minerals. After three days there he left for Paris in the diligence, 24 hours, and thence by Calais and Dover to London. The whole journey had occupied a month, 3rd August to 2nd September.

It is a pity no more diaries of Konig's have survived. Perhaps he gave up keeping them. All we know of his later years is the little we can glean from his reports to the Trustees and his draft notes for these.

When he was giving evidence before the Royal Commission in 1848 and 1849[1] he was an old man and this appears to some extent in his answers to questions. The loss of rank that he felt he had suffered when the department of Natural History was divided in 1837 still rankled. He considered he was degraded " not in the title but in the rank formerly held by the Head of the Department of Natural History, the most ancient, and for which the British Museum was mainly founded "; and it is rather sad to find him saying, at the end, " not a word of approbation has been bestowed on me though by far the greater part of my life has been spent in the service of the Museum ".

In 1850 he was still actively engaged with the mineral Collection and he proposed to change the arrangement of the minerals on the general lines of the new chemical system of Berzelius (1847). With this end in view he had " placed chemical labels " with each mineral species during 1848 and 1849. Unfortunately, before this rearrangement could be even commenced he died suddenly at his official residence as the result of a stroke on 6th September, 1851. He was 77.

It seems that his sister had died before him and that he had no other close relations for by his will, made on 4th December, 1850, he left almost everything to charities, after making small bequests to his executors and to his two servants. There were three bequests to his native city of Brunswick; an orphanage, a poor-house, and a hospital; and bequests of £200 each to: the Literary Fund, the Bloomsbury Dispensary, the Refuge for the Destitute, the Society for the relief of Foreigners in Distress, the German hospital at Darlston, and the Society for the Protection of Life from Fire. His executors were his " dear friends " Robert Brown Esq., of the British Museum and Dean Street, Soho, and Alexander Henderson, M.D., of Curzon Street. The will was proved by Robert Brown on 13th November, 1851.

Konig had spent the last fifty years of his life in England and for forty-four of those he had devoted himself to the service of the Museum and work on the Mineral Collection had been, for most of that time, his chief care. His death virtually marked the end of the first hundred years of the history of this Collection. His successor, George R. Waterhouse, was a palaeontologist and there was no assistant qualified to take charge of the Minerals. For two years James Tennant, Professor at King's College and also a mineral dealer, was employed " to arrange and catalogue the minerals at £2 a day ". It was not until 1857, when the old department was replaced by the two departments of Geology and Mineralogy that Nevil Story-Maskelyne became the first Keeper of Mineralogy[2] and a new chapter in the history of the

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[1] *Report of the Commissioners appointed to inquire into the Constitution and Government of the British Museum . . .*, London, 1850. p. 163.

[2] The Keepership seems to have been first offered to Mr. W. G. Lettsom[3] but the Government " through diplomatic difficulties in Mexico at that date " induced him to remain at Monte Video, where he was British Consul. Samuel Highley says that the post was then offered to him through Professor Thomas Bell but for various reasons he declined it. See *Record of the Life-work from* 1844 *to* 1885 *of Samuel Highley, F.G.S., &c., Publisher, Scientific Educationalist, Author, Journalist, Editor, Lecturer on Science, Founder Candidate for nomination for Charterhouse.* (1886).

[3] William Garrow Lettsom (1805–87) was joint author with R. P. Greg of the *Manual of the Mineralogy of Great Britain and Ireland* (London, 1858). He had joined the diplomatic service in 1831 and was Secretary to the British Legation in Mexico and later became Chargé d'Affaires there. The British Government suspended diplomatic relations for a time, owing to Mr. Lettsom's representations, and he was the object of an attempted assassination. In 1859 he was appointed Consul General and Chargé d'Affaires to the Republic of Uruguay and remained at Monte Video till 1869 when he retired from the diplomatic service. He was elected a Fellow of the Royal Astronomical Society, 13th April, 1839. *Mon. Not. R. astr. Soc.*, **48** : 1888, pp. 165–166.

Mineral Collection began. This chapter, written by Sir Lazarus Fletcher, Maskelyne's successor, is to be found in the History of the Collections of the Natural History Departments of the British Museum (1902) wherein is also to be found the history of the first hundred years which I have here endeavoured to recount at much greater length. Throughout this work I have been greatly helped by constant reference to the notes compiled by Fletcher and his colleagues in 1902, and to Dr. Herbert Smith's copy of Konig's diary notes made in 1942.

APPENDIX

Notes on some early collections of rock-specimens

Mention was made in the text (p. 247) of the collections of rocks made by some of the early explorers and presented to the British Museum. Among these were some presented by the Admiralty. The following are brief notes on further early rock collections presented by the Admiralty and others and a short reference to Konig's arrangements for the storage of the rock collections.

The Admiralty also presented to the Museum specimens collected on some of the early Arctic and Antarctic expeditions.

A report in January, 1819, refers to " specimens of various substances brought by Sir John Ross from the vicinity of the North Pole ". No specimens representing this presentation by the Admiralty have been identified except the knives of meteoric iron set in bone handles, made from the Cape York meteorite, and given to Captain Ross in 1818 by the esquimaux of Prince Regent's Bay.[1, 2]

The Admiralty also presented to the Museum specimens collected by Commander William Edward Parry on his first Arctic Expedition, 1819–20, and Konig described the rocks in an appendix to Parry's Journal of the Voyage in 1824. Konig had submitted a short account of this collection to the Trustees on 11th April, 1823, and shortly afterwards his diary (2nd May) records " receipt of a letter from Sir G. Clerk who desires to have specimens of Parry's voyage sent to the Geol. Soc." After the next Trustees' meeting he notes: " rocks of Parry's ordered to be sent to the Geol. Soc.". It seems, however, that these were duplicates as a collection of 26 specimens remained in the Museum[3] while another set of 33 specimens was in the Geological Society's collection " Presented by Sir George Clerk[4] in 1823 ".

In December, 1820, Konig reported rock-specimens from Sierra Leone and the Los Islands collected by Dr. H. Nichol and presented by Henry, Earl Bathurst, Secretary for the Colonies, with the promise that he would send collections from other colonies. Konig took the opportunity to draw the attention of the Trustees to the fact that there were in his Department already a considerable number of rock-

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[1] Prior (G. T.). *Catalogue of Meteorites* . . . . Second edition by Max H. Hey, London, 1953, p. 66.

[2] A collection of rocks made by Sir John Ross in 1818 was presented to the Geological Society in 1819 by Dr. John MacCulloch who, in that year published " Geological Memoranda " in Ross's narrative of his voyage. This collection was transferred to the Museum with the rest of the foreign collections of the Geological Society's museum in 1911. Smith (W. Campbell), *Catalogue of the Rock Collections in the Mineral Department* . . . , *Part II*, *America*, London, 1932, p. 53.

[3] Smith (W. Campbell). *Catalogue of the Rock Collection* . . . , *Part II*, *America*, London, 1932, p. 59. This gives full references to Konig's account of this collection published as an appendix to Parry's Journal, 1824, and also in two independent publications in 1823.

[4] Sir George Clerk (1787–1867). A Lord of Admiralty, 1819–27.

specimens illustrative of the geology of Great Britain, Jersey, Guernsey, the Hartz Mountains, etc. . . ., and he asked for a room in the basement to be fitted up with chests of drawers which, he suggested, could be made of common deal . . . at no great expense.

This was done and he reports, 9th January, 1824, having moved to the basement Sir William Hamilton's Vesuvian Collection. However, he came to regret this move for four years later (11th January, 1828), he reported that " he has employed part of his time in selecting from the minerals and rock-specimens in the basement story all such as appeared worthy of being preserved and depositing the refuse in boxes in the cellar. Mr. Konig thinks it his duty to state that the N.W. room in the basement storey is so excessively damp that many of the articles kept there in drawers and among which are those brought from various expeditions have much suffered and several of the tickets and paper boxes in the drawers nearest the floor are completely destroyed by it ". Perhaps owing to this sad state of affairs Ross's specimens from the vicinity of the North Pole had joined the refuse in the boxes in the cellar.

In the meantime the Admiralty had presented the rocks collected during an expedition in 1822–24 to northern and central Africa by Dixon Denham, Hugh Clapperton and Dr. Walter Oudney. Konig briefly described the specimens in an Appendix to the narrative of the expedition published in 1826.

Specimens collected by Lieutenant (later Admiral Sir) Edward Belcher from Kotzebue Sound, Alaska, and from the neighbourhood of San Francisco on Captain Beechey's expedition to the Pacific and the Behring Straits in 1825–28 were presented by the Admiralty in 1828, and the next year from Lord Prudhoe (afterwards Fourth Duke of Northumberland) came a set of specimens collected on an excursion from Cairo into Arabia Petrea in August and September, 1828. During his evidence before the Select Committee in 1835, when asked whether this collection was of considerable value, Konig replied that the specimens were chiefly interesting from their locality, " the Holy Land ".

One more collection came from the Admiralty in 1831 or soon after. This consisted of specimens from various localities on the shores of the Straits of Magellan and Tierra del Fuego collected in 1829 and 1830 during the surveying voyage of H.M.S. *Beagle* commanded by Captain Robert Fitzroy. This was the voyage previous to that on which Charles Darwin sailed with Fitzroy in 1831.

The last of these early collections presented by the Admiralty during Konig's time consisted of the specimens collected during the voyage of Rear-Admiral Sir (then Captain) James Clark Ross in Southern and Antarctic Regions during the years 1839–43. Geological notes on this expedition were written by Robert M'Cormick, Surgeon to the Expedition and were published as an appendix to Ross' account of the voyage. Konig did not describe any of the rocks of this collection, presumably because he knew M'Cormick was writing up the geological notes. Years later, in 1890, there came to the Museum under the will of Deputy Inspector-General M'Cormick more specimens of this collection and in 1899 some of these were described by G. T. Prior. Among the specimens were some taken by M'Cormick from the gizzards of penguins and the stomachs of seals. Had these been examined and identified by M'Cormick or Konig they might have realized that in them they had evidence of the presence of metamorphic and igneous rocks on the beaches of the Antarctic continent. Other evidence from the beaches of the continent was not obtained for over fifty years, when members of the Southern Cross Expedition (1898–1900) landed at Cape Adare.

APPENDIX II

Brief notes on the meteorites acquired in the early days of the British Museum

A history of the collection of Meteorites in the Museum has been written by Sir Lazarus Fletcher and published in successive editions of his guide-book, " An introduction to the study of meteorites " and in " The History of the Collections . . . " where there is also a chronological list of the meteorites acquired from 1753 to 1903.

When Konig joined the museum staff there were only seven meteorites in the Mineral Collection: a fragment of Krasnojarsk, the Pallas Iron, a Stony-Iron, had been presented by the Academy of Sciences in St. Petersburg (Leningrad) in 1776. This, in accordance with the ideas of that time, was exhibited as a specimen of native iron (see above, p. 241). Small fragments of Otumpa, a very large iron meteorite found in Argentina, were presented by the Royal Society in 1778, and three others (Stones), Benares, Wold Cottage, and Siena, were presented by Sir Joseph Banks in 1802 and 1803, and specimens of the famous L'Aigle fall were presented by Professor Biot in 1804. One piece of an iron meteorite, Siratik, from Senegal, was in the Hatchett collection purchased in 1799.

Soon after Konig's appointment seven more meteorites were acquired with the Greville Collection (see p. 242). After that there were occasional acquisitions among which the most notable was the large mass of the Otumpa iron, 1,400 lb. (634 kg.) presented by Sir Woodbine Parish in 1838. At the time of Konig's death in 1851, 70 falls were represented and two more specimens were presented in 1856 and 1857, one of which, Imilac, was already represented by a large specimen, 9 kg., presented by Sir Woodbine Parish in 1828. It was on this basis of 71 represented falls that Nevil Story-Maskelyne built up the collection which, in his day, rivalled that of Vienna, and which is now one of the largest in the world.

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